FEL'D, Semen Davidovich; STEBUNOV, N.S., red.

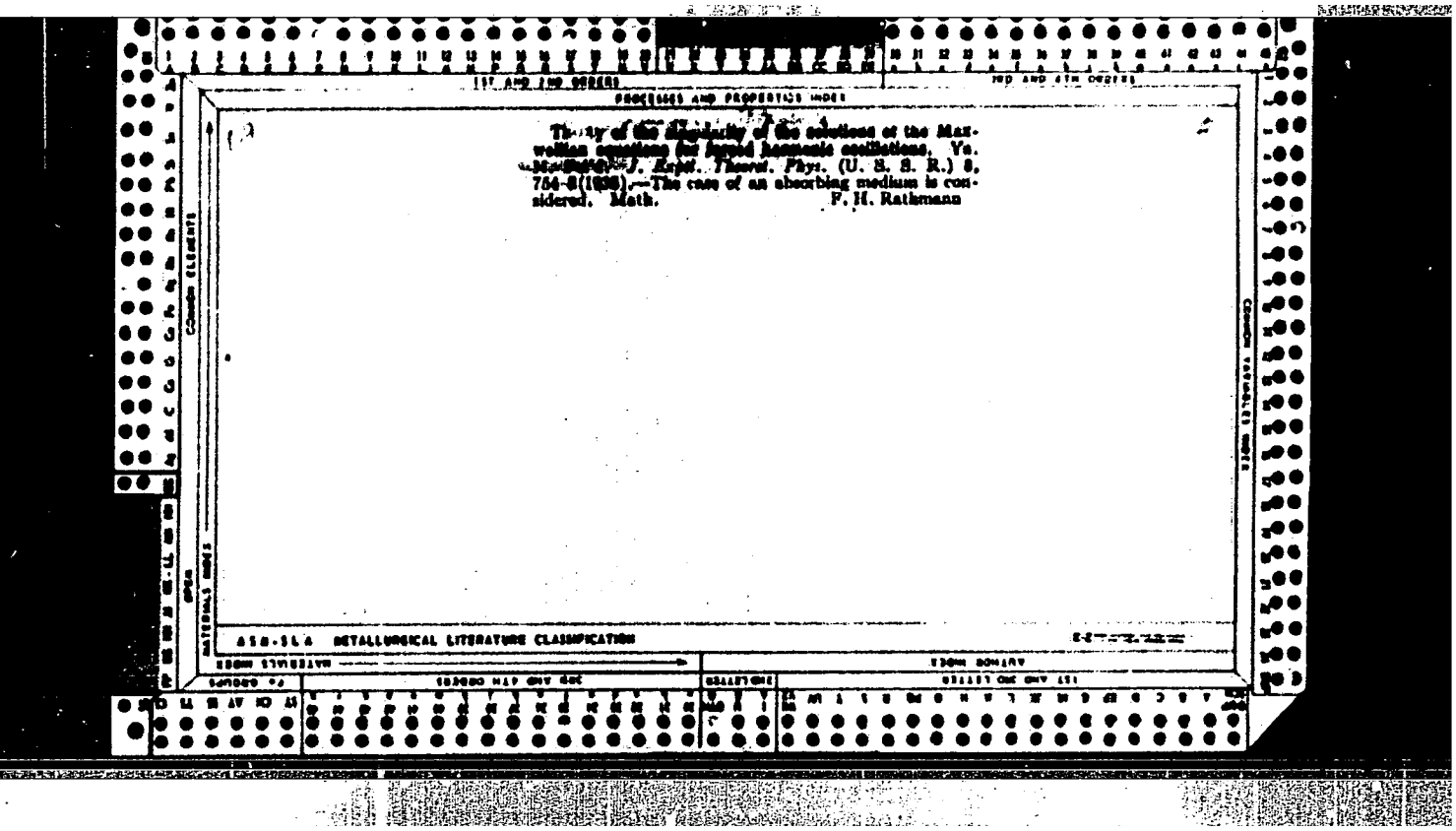
[Unified power balance of the national economy; problems of optimum utilization] Edinyi energeticheskii balans narodnogo khoziaistva; problemy optimizatsii. Moskva, Ekonomika, 1964. 311 p. (MIRA 17:10)

FEL'D, V. V.

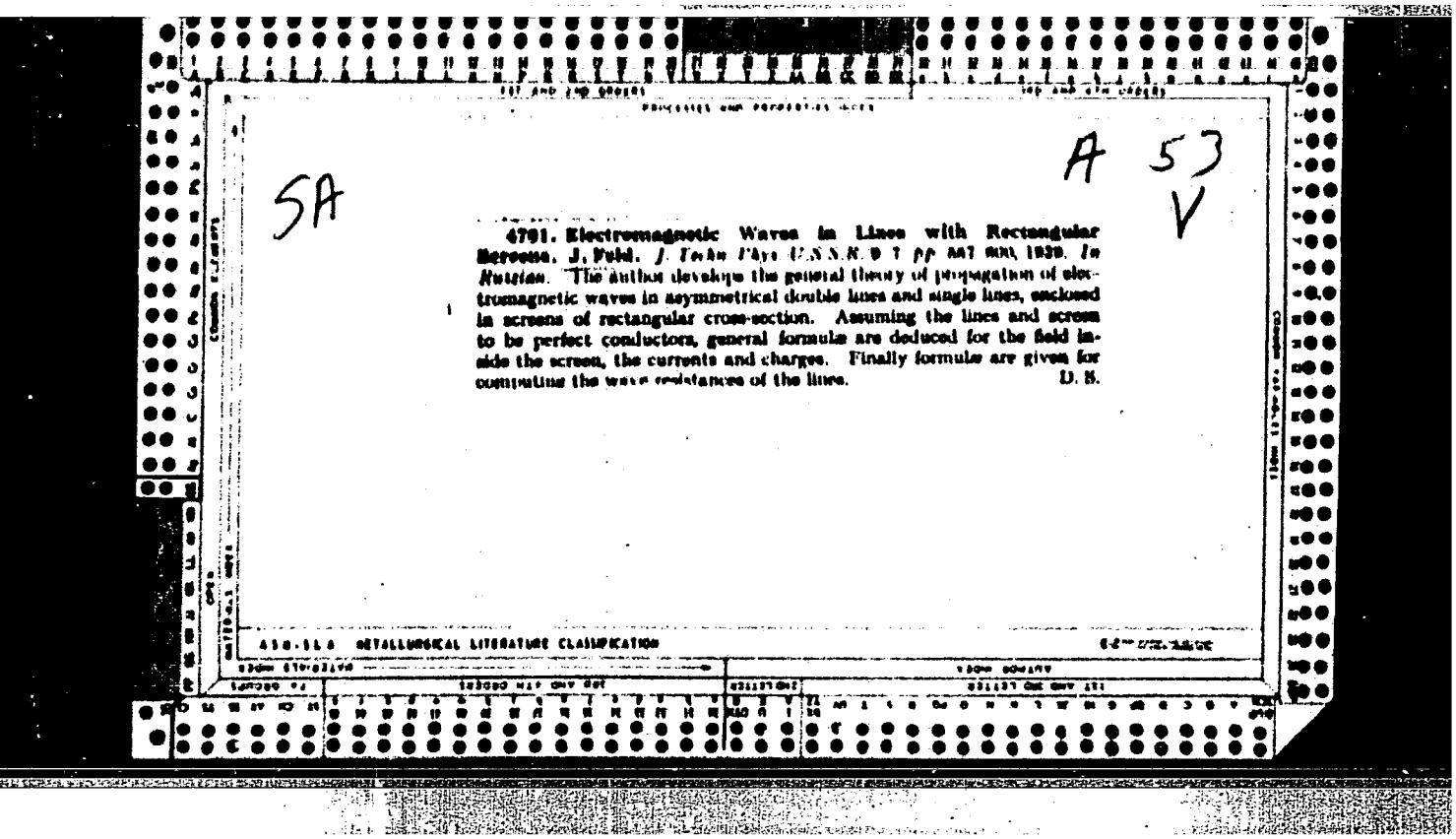
"Textbooks on Experiments in Chemistry for Teachers' Colleges (Technique and Methodology of Chemical Experiments in the Secondary School)" Khim. v shkole, No.1, 1952. Reviewed by Yu. V. Plentner.

TETERIN, M.L.

Metallurgical tables for students (Metallurgical tables. V.V.Fel'd. Reviewed by M.L.Teterin). Khim. v shkole 10 no.1:76-77 Ja-F '55.
(Metallurgy—Tables, calculations, etc.) (Fel'd, V.V.)



...y of the stability of the solutions of the Maxwellian equations for forced harmonic oscillations. Ya. [illegible], J. Exper. Theoret. Phys. (U. S. S. R.) 8, 754-8(1938).—The case of an absorbing medium is considered. Math. F. H. Rathmann



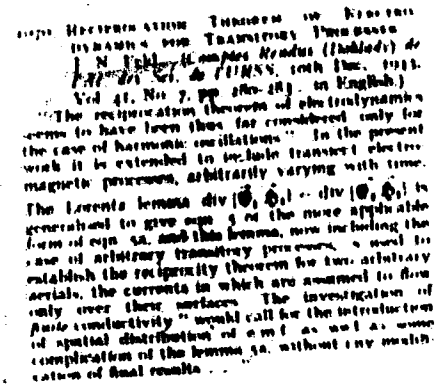
5A

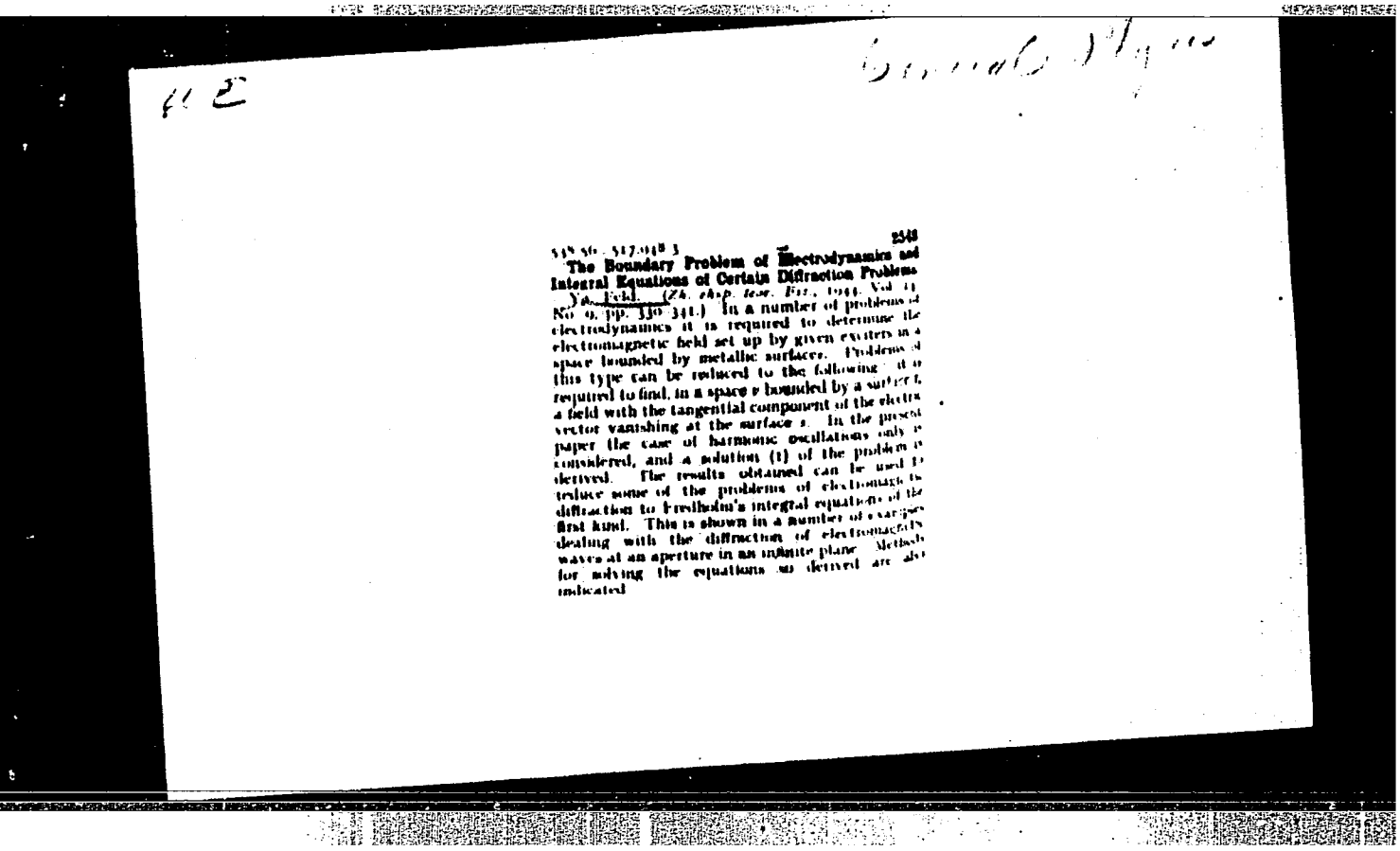
A 53
V

4791. **Electromagnetic Waves in Lines with Rectangular Screens.** J. Feld. *J. Techn. Phys. U.S.S.R.* 9 7 *pp* 587 600, 1939. *In Russian.* The author develops the general theory of propagation of electromagnetic waves in asymmetrical double lines and single lines, enclosed in screens of rectangular cross-section. Assuming the lines and screen to be perfect conductors, general formulæ are deduced for the field inside the screen, the currents and charges. Finally formulæ are given for computing the wave resistances of the lines. D. S.

WC.

Acoustic + Acoustic Systems





2548

The Boundary Problem of Electrodynamics and Integral Equations of Certain Diffraction Problems.

Ya. Feld. (*Zh. eksp. teor. fiz.*, 1944, Vol. 14, No. 9, pp. 330-341.) In a number of problems of electrodynamics it is required to determine the electromagnetic field set up by given emitters in a space bounded by metallic surfaces. Problems of this type can be reduced to the following: it is required to find, in a space v bounded by a surface s, a field with the tangential component of the electric vector vanishing at the surface s. In the present paper the case of harmonic oscillations only is considered, and a solution (1) of the problem is derived. The results obtained can be used to reduce some of the problems of electromagnetic diffraction to Fredholm's integral equations of the first kind. This is shown in a number of examples dealing with the diffraction of electromagnetic waves at an aperture in an infinite plane. Methods for solving the equations so derived are also indicated.

WL

538.3

Initial Boundary Problems of Electrodynamics.
J. N. Feld. (*C.R.Acad.Sci.U.R.S.S.*, 1945, Vol. 48, No. 3, pp. 172–174. In English.) A formal solution of the electromagnetic field within a space v bounded by a closed surface s when the tangential components of the electric and/or magnetic vectors are given as arbitrary functions of time. Equations (6) and (7) give the electric and magnetic fields at the point of observation assuming zero conductivity within v and zero tangential field at the surface s.

WE

Aerials + Transmission Lines

1770

The General Reciprocity Theorem in the Theory of Receiving and Transmitting Antennae. [illegible] Lebl. (C.R. Acad. Sci. U.R.S.S., 10th September 1935, Vol. 48, No. 7, pp. 476–478. In English.) "The reciprocity theorem for two arbitrary antennae in the case of harmonic oscillations of one and the same frequency f is written . . . $J_0 I_1 = J_1 E_0$ where J_0 and J_1 are the currents passing through the terminals of the first and second antennae when operating as receiving aerials, and E_0 and E_1 are the total e.m.fs of the generators connected to the terminals of the antennae when the latter are operating as transmitting aerials. . . . [This theorem] holds, however, only under the condition that the internal (complex) resistances of the generators E_0 and E_1 corresponding to the resistances of the receivers Z_0 and Z_1 . . . are equal." The more general case, when the condition is not fulfilled, is considered in this paper.

FEL'D, YA. N. PA 19T27

USSR/Antennas - Design Sep 1946
Mathematics, Applied

"Diffractional Antennae," Ya. N. Fel'd, Candidate of Mech Sci, 19 pp

"Radiotekhnika" Vol I, No 6

A general method for determining the fields of diffractional antennae, which is further employed for an investigation of antennae with axial symmetry. The problem is reduced to a system of linear equations with constant coefficients, similar to the Kirchhoff equations for coupled circuits.

19T27

W E.

Aerials Transmission lines

3049

621.396.67

Diffraction Antennae with Axial Symmetry. J. S. Fehl. (*C. R. Acad. Sci. U.R.S.S.*, 20th Jan. 1940—Vol. 51, No. 3, pp. 155-118. In English.) The aerials considered are obtained by cutting the surface of conductors. Formulae are derived and applied to the determination of the field inside and outside a sphere from which a narrow belt has been cut out, the excitation being due to a dipole at the centre.

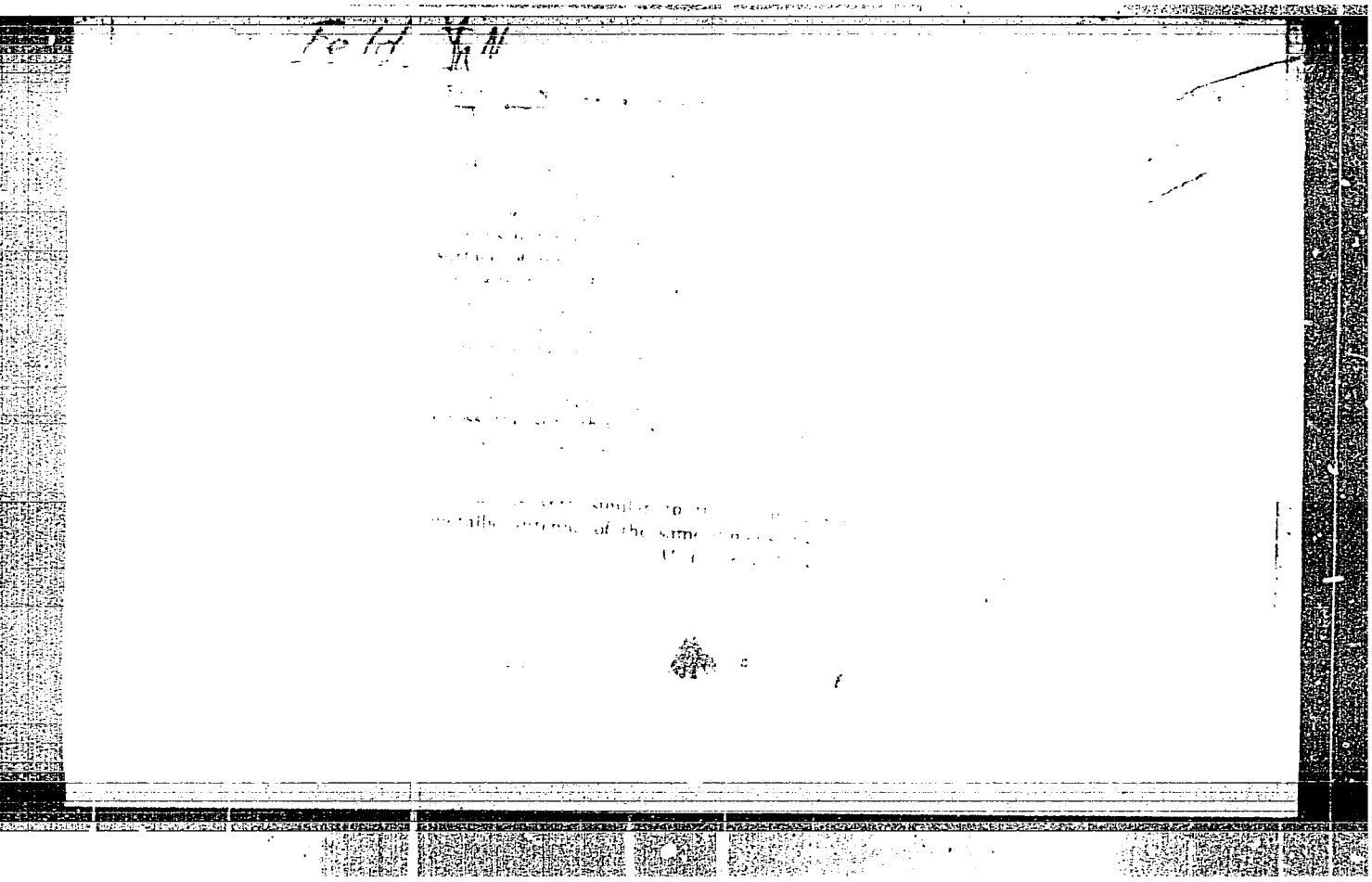
1949

W.E.

3048

Radiating Surface Systems. J N Feki (C R Acad Sci URSS, 30th Jan 1949, Vol 63, No 3, pp 103-106) (In English) A closed metal surface of dimensions comparable with the wavelength can in certain cases, if suitably excited, compare favourably with ordinary radiating systems. Formulae are derived for the e m field and the surface distribution of current for a spherical surface aerial excited by a known current distribution along a radial conductor inside the surface. The method adopted for the solution can easily be generalized for surface aerials of arbitrary form with an arbitrary arrangement of coupling elements.

1749



FELD, Y. N.

SA

B CB

Q

Radiating slits in circular waveguides. I. Infinite waveguide with longitudinal slit. FELD, Y. N. *Radiotekhnika*, 2 (*No.* 5) 42-55 (1947) *In Russian.*—The electrical and magnetical field vectors are calculated, yielding information on the potential distribution across the slit and on the reflection coefficient of the waveguide, a different method of approach from that of Pistolkors being adopted. By placing a metal screen across the waveguide at a critical distance *l* beyond the slit, the max. travelling wave coefficient can be obtained, i.e. optimum conditions for power radiation through the slit. The waveguide so terminated is comparable with an infinite one with two slits separated by 2*l*, the mirror image principle being thus employed. A. L.

4

FEL'D, YA. N.

PA40T99

USSR/Radio — Sep 1947

Slots - Accessories
Antennas, Slot

"Slot Antennas," Ya. N. Fel'd, 14½ pp

"Zhur Tekh Fiz" Vol XVII, No 9

Author explains the general theory of slot antennas, which can be applied to narrow slots cut into the metal surfaces of any cavity resonator or wave guide. Author obtained an integral differential equation, determining the rule for the distribution of charge along the slots during the operation of the slot antenna during either transmission or reception. It was shown that in the case where the slots are very narrow the inte-

[redacted] 40T99

USSR/Radio (Contd) — Sep 1947

gral differential equation can be replaced by a differential equation analogous to that used in telephones. Submitted, 25 May 1947.

[redacted] 40T99

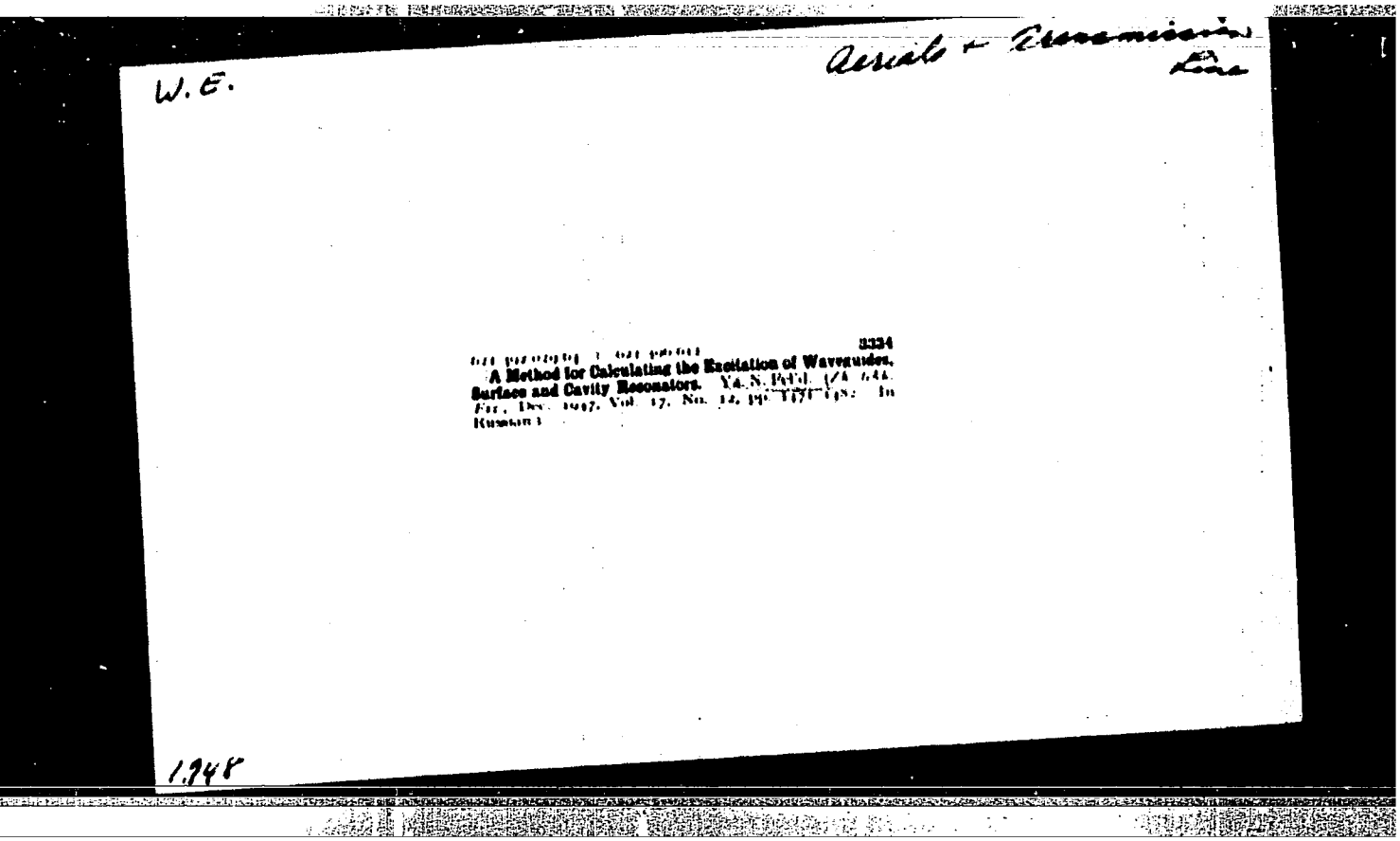
W.E.

Aerials - Transmission Lines

3344

Slot Aerials : Part 2. Va S [illegible] (Zh Tekh Fiz., Dec. 1947, Vol 17, No 12, pp [illegible]) (In Russian) Slot aerials in cavity resonators are examined for the case in which the excitation frequency differs little from the natural frequency of the resonator before the slots have been made. Formulae are derived for determining the voltage distribution along the slot and from this the fields inside and outside the aerial can be calculated. The results obtained are applied to the case of cylindrical resonators and some experimental curves are shown.

1948



W.E.

Aerials + Transmission Lines

3334

A Method for Calculating the Excitation of Waveguides, Surfaces and Cavity Resonators. Ya. N. Fel'd. (Zh. tekh. fiz., Dec. 1947, Vol. 17, No. 12, pp. 1371-1398: In Russian)

1948

FELD Yav. N.

SA

B. 66
a

Laws of potential distribution along slits. FELD, I. N. *C.R. Acad. Sci. URSS*, 55 (*No.* 5) 407–10 (1947).—Considers the potential distribution along a narrow radiating slit in the surface of a waveguide excited by internal sources. Examples given are: (*a*) a rectangular waveguide (H_{10} wave) with slit at right angles to the axis; (*b*) a spherical waveguide with slit along a parallel of latitude and in which an axially symmetrical electric wave is excited. V. C. A. P.

FEL'D, Ya. N.

PA 1T99

USSR/Mathematics 1 May 1947

"Radiating Slits in Tuned Endovibrators," Ya N Fel'd, 4 pp

"Dok Akad Nauk USSR Nov Ser" Vol LVI, No 4

1T99

PA 9755

FEL'D, YA. N.

USSR/Antennas - Radiation May 1947
Antennas - Resistance

"The Amount of Radiation and the Complex Radiation Resistance of Diffraction Antennas," Ya. N. Fel'd

"Doklady Akademii Nauk SSSR" Vol LVI, No 5

Mathematical treatment by theory of complex functions and Poynting's vectors.

9755

D-70 FEL'D, YA. N.

D-70 FEL'D, YA. N. Osnovy teorii shchelevykh antenn (Theoretical principles of slit antennas). Moscow, Sovetskoye radio, 1948. 160p. DLC TK6565.A6F4; OUMF No. 197-I.

The book shows that the voltage between the edges of the slit of an antenna is the basic physical magnitude determining all the properties of a slit antenna, and that, on the basis of the value of the tangential component of the electrical vector on the surface of the slit, the field outside and inside the antenna can be calculated. The author developed a theoretical apparatus allowing for the inclusion of all the various slit systems using comparatively simple means which are entirely suitable for practical calculations, providing that the ratio of the width of the slit to the wave length is small.

PA 20/49T108

FEL'D, YA. N.

Oct 48

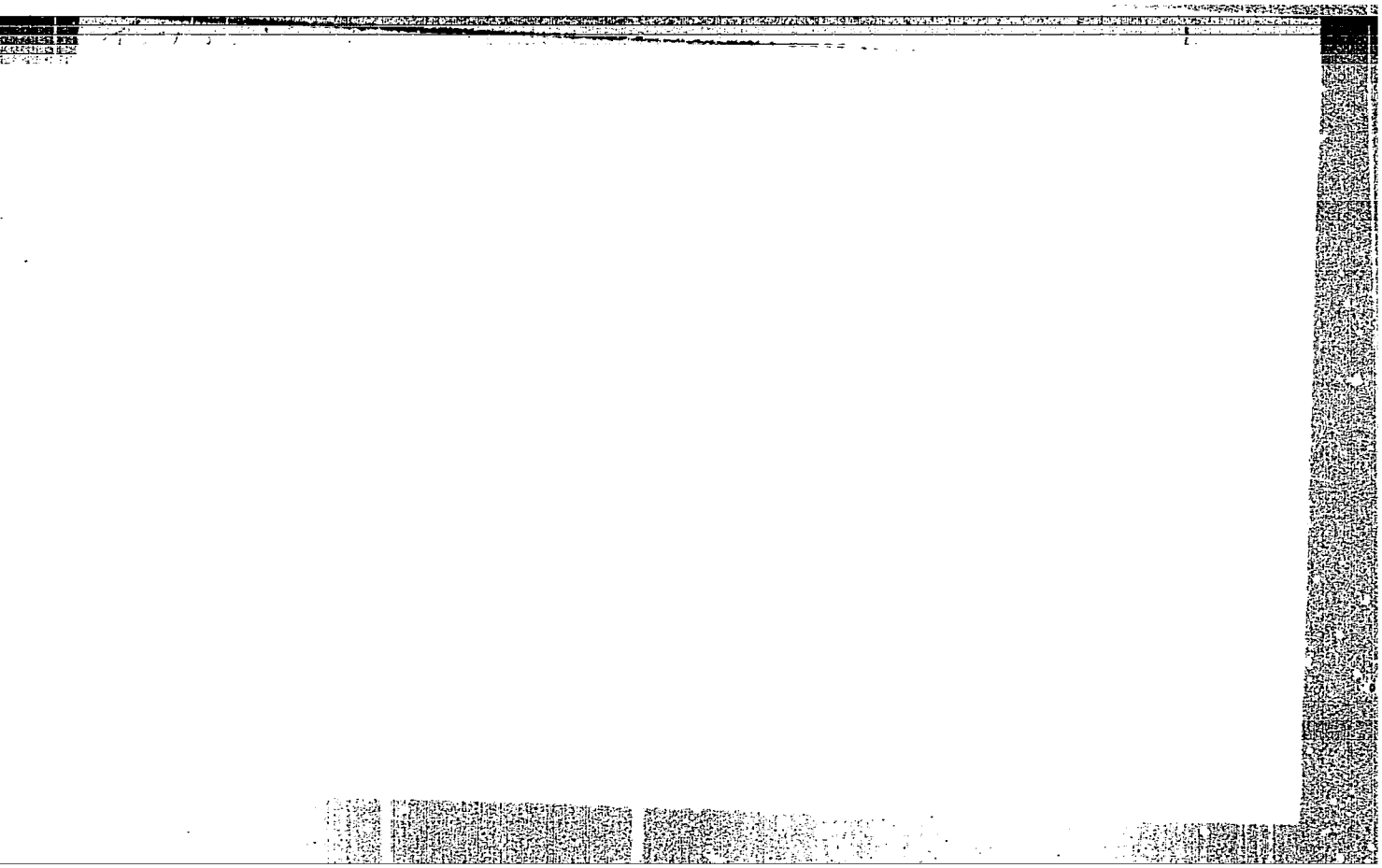
USSR/Radio
Antenna, Slot
Mathematics, Applied

"Multiple-Slit Antenna," Ya. N. Fel'd, 8 pp

"Zhur Tekh Fiz" Vol XVIII, No 10

Studies problem of slit antenna which has an arbitrary amount of narrow slits, placed irregularly along its length. Mathematical treatment of problem when these slits are enclosed in a metallic cover, and acted on by internal as well as external forces. Submitted 9 Mar 48.

20/49T108

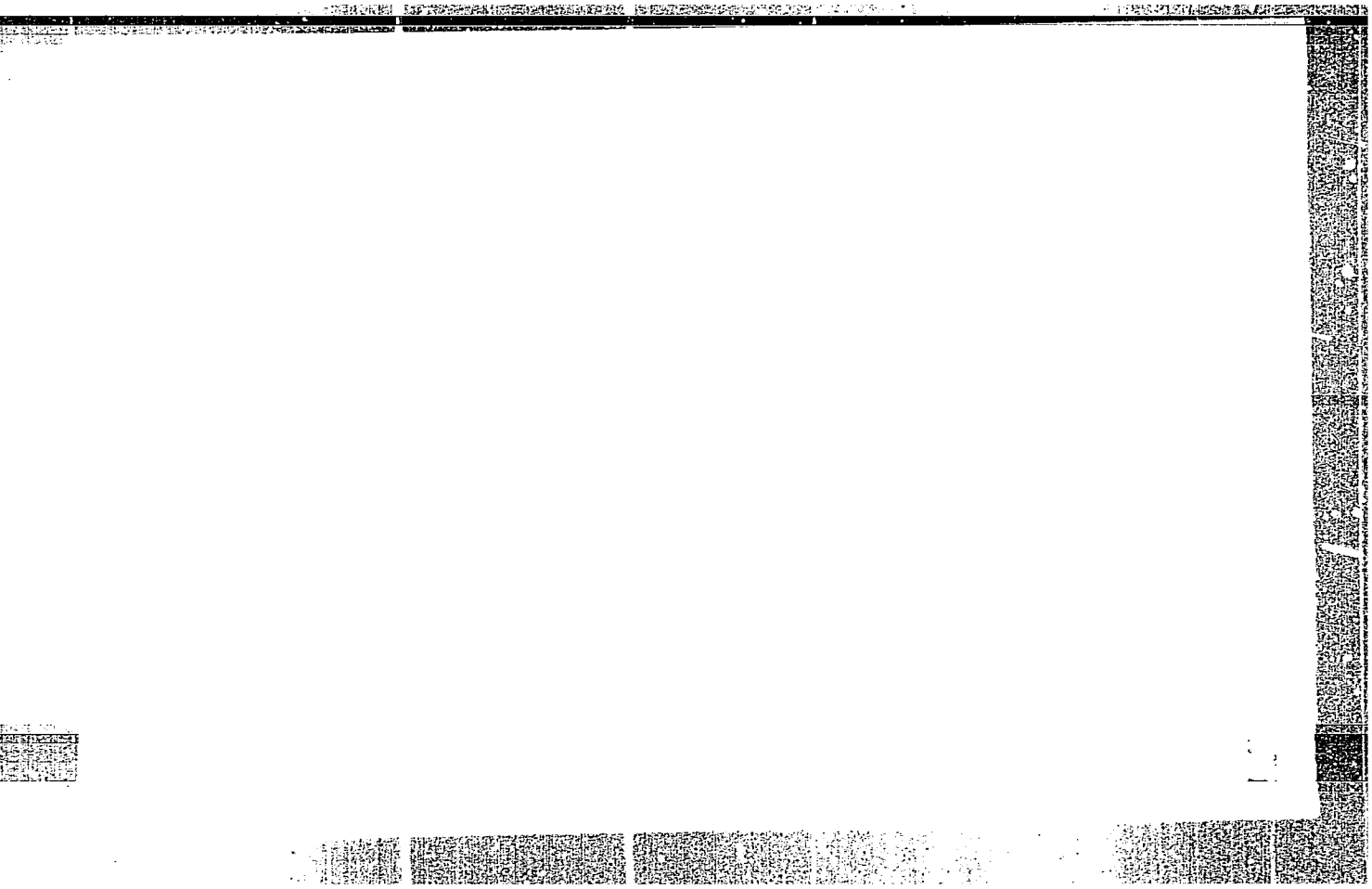


FEL'D, Ya. N.

Wireless Engineer
June 1954
General Physics

Induction of Currents by Moving Charges.—Ya. N. Fel'd. (*C. R. Acad. Sci. U.R.S.S.*, 21st Nov. 1953, Vol. 93, No. 3, pp. 447-450. In Russian.) An analysis is made of the field due to a charge moving between a pair of parallel disk electrodes, connected externally by a conductor. A general expression for the current flowing through the conductor is derived in terms of the electrode radius, r_0, and separation, a, and the velocity of the charge, u. A periodic discharge could be obtained with particular values of r_0, a and u.

10/4/54



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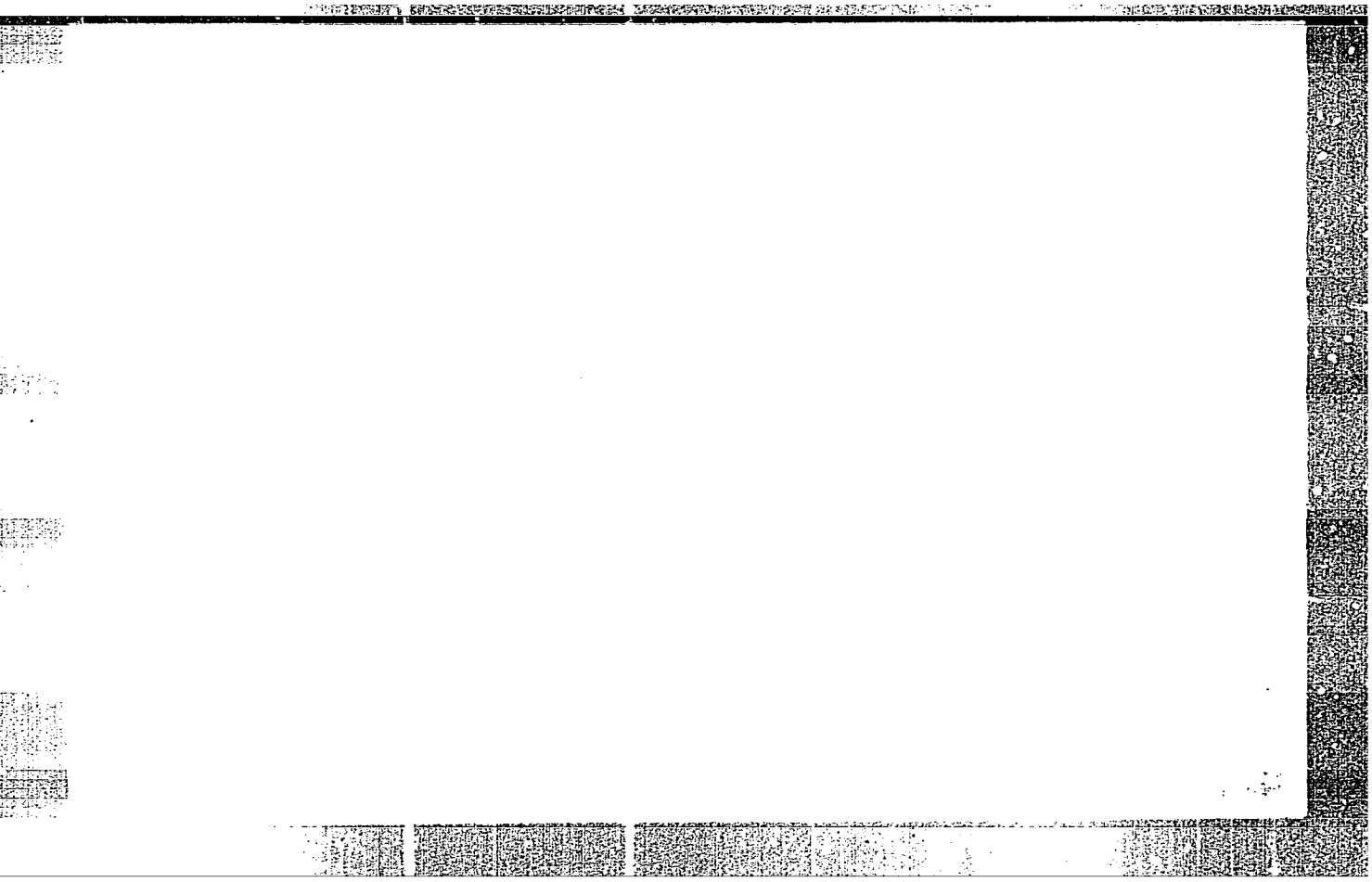

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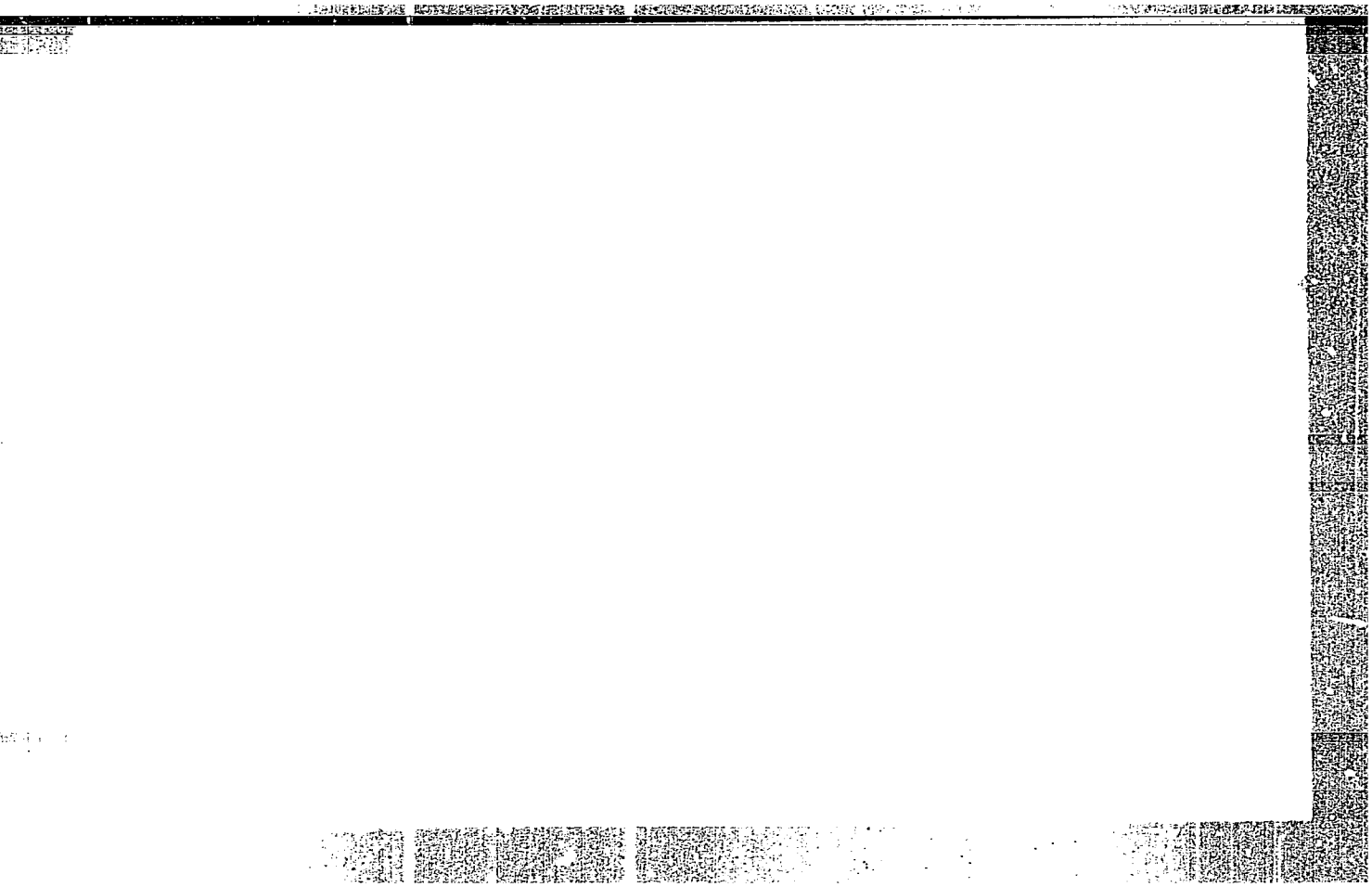

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FEld, Ya. N.

USSR/Radiophysics - Radio-wave Propagation. Ionosphere, I-6

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35288

Author: Fel'd, Ya. N.

Institution: None

Title: Incidence of Electromagnetic Waves on Double Infinite Grating

Original Periodical: Dokl. AN SSSR, 1956, 107, No 1, 71-74

Abstract: Two infinite plane gratings, consisting of 2 rows of parallel metallic rods, are considered. The wires of the graging are located in parallel planes and are shifted relative to each other in a direction perpendicular to the axis of the wires. The distance between gratings a, their period l, and the wavelength λ are much greater than the radius of the rods r_0. The gratings are placed in any electromagnetic field. It is desired to find the currents in the wires of the gratings and the total field. The currents in the wires satisfy a system of an infinite number of linear algebraic equations, the coefficients of which depend only on the distance

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USSR/Radiophysics - Radio-wave Propagation. Ionosphere, I-6

Abst Journal: Referat Zhur - Fizika, No 12, 1956, 35288

Abstract: between the numbers of the equation and the unknown. To solve this sytem, the author forms 2 functions of complex variable, for which the currents in both gratings are the Fourier coefficients. These functions are simply expressed in terms of other functions, from which the Fourier coefficients are known coefficients of the initial system of equations. The determination of the current in the gratings is thus reduced to determining the functions of complex variable from their Fourier coefficients and to the inverse operation. The general method is applicable to the problem of the incidence of a plane wave. The formal solution for the total field is obtained in the form of slowly-convergent series. After improving the convergence one obtains expressions that make it possible to calculate the reflection coefficient R and the transmission coefficient Q for actual cases. Values of $|R|$ and $|Q|$ are given for normal incidence of the wave on the double gratings at $r_0 = 0.01\lambda$, and $l = 0.2\lambda$ for 3 values of a/λ. With this, the wires of the gratings are shifted by 1/2. For example, at $a/\lambda = 0.50$, $|R| = 0.973$, and $|Q| = 0.229$.

Card 2/2

FEL'D, YA. N.

AUTHORS: Pistol'kors, A.A. and Fel'd, Ya.N. 109-11-5/8

TITLE: Main Stages in the Development of the Theory of Antennae and Feeders in the USSR. (Osnovnye etapy razvitiya teorii antenn i fidernykh ustroystv v SSSR)

PERIODICAL: Radiotekhnika i Elektronika, 1957, Vol. II, No.11, pp.1390 - 1412 (USSR)

ABSTRACT: Work in this field in the Soviet Union was originated by M.V. Shuleykin, who developed a method for the design of long- and mediumwave antennae. The method was further developed by I.G. Klyatskin, who found formulae for calculating the radiation resistance and the efficiency of the long- and mediumwave antennae. In 1922, D.A. Rozhanskiy introduced the method of induced electromotive forces into the theory of antennae (independently of Brillouin). The method was further developed by A.A. Pistol'kors and several other workers. During the Twenties and Thirties, the development of shortwave techniques led to the design of multi-element shortwave antennae. These were first proposed by Tatarinov and Bonch-Bruyevich, while Pistol'kors introduced a special parameter called the "directivity coefficient" for the evaluation of the directional properties of the antennae. The theory of

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Main Stages in the Development of the Theory of Antennae and Feeders in the USSR.

conducting screens and reflecting grids was first considered by Kontorovich and later developed by B.Ya. Moyzhes. During the late Thirties, an attempt was made by G.C. Ramm to devise an analytical approach which would permit the design of an antenna to have prescribed directional characteristics. The theory was later generalised and simplified by I.I. Vol'man, while, in 1939, Fradin investigated the feasibility of a highly-directional spherical antenna. Also in 1939, Pistol'kors proposed a method for constructing the directional antennae by using a number of radiators arranged in an appropriate array. The theory of receiving antennae was first considered by Pistol'kors and later by I.A. Dombrovskiy and Fradin, while Neyman and later I. Vol'pert investigated the reciprocity principle. The theory of resonant dipoles was first considered by M.A. Leontovich and M.L. Levin, who introduced an integral-differential equation for the distribution of the current along a thin dipole. This problem was further investigated by A.I. Akhiyezer and G.Ya. Lyubarskiy, while the dipoles of finite thickness were investigated by A.Ye. Suzant and M.G. Belkina. The first work on the theory of slot antennae was published by

Neyman, whereas the duality principle was first formulated in a work of Pistol'kors. Methods of the design of parabolic mirror antennae were investigated by Uzkov and a number of other workers, while M.A. Miller, in 1952, investigated the problems of the propagation of electro-magnetic waves over flat surfaces (the propagation of surface waves). S. Kh. Kogan investigated the propagation of waves along infinite helical lines; similar problems were also studied by S.A. Vakin and Smirnov. During 1947-50, Vaynshteyn published a number of important works dealing with the theory of the diffraction of electro-magnetic and sound waves at the open end of a wave-guide. Theoretical investigation of 2-wire and coaxial feeders (lines) was first undertaken by Tatarinov and S.I. Nadenenko; further work was done by Vol'pert in 1940 and Fel'd in 1939, while A.L. Fel'dshteyn, in recent years, proposed a general method for the investigation of non-uniform trans-mission lines. The theory of non-symmetrical lines was studied by Pistol'kors and G.Z. Ayzenberg. Single-conductor lines were first investigated by Fel'd in 1939 and, since then, further work has been done by V.N. Kessenich and V.V. Vladimirskiy.

109-11-5/8

Main Stages in the Development of the Theory of Antennae and Feeders in the USSR.

The principles of waveguide propagation of electro-magnetic waves were first presented in a book by B.A. Vvedenskiy and the problem was also studied by a number of outstanding workers such as Ya.L. Al'pert, Leontovich, Rytov, B.Z. Katsenelenbaum and V.A. Il'in. The theory of the excitation of waveguides was initiated by A.L. Drabkin, Vol'man, G.V. Kisun'ko and a number of other workers. A number of technical publications have been devoted to the study of non-symmetrical waveguides; in this field, the works of Katzenelenbaum, published in 1955 and 1956, are of particular importance. There are 5 figures and 204 Slavic references.

AVAILABLE: Library of Congress

Card 4/4

FELD, Ya. N.

"Diffraction of Plane Sound Waves on a Half-Infinite Grating of Thin Bars."

paper presented at the 4th All-Union Coff. on Acoustics, Moscow, 26 May - 4 Jun 58.

FEL'D, YA. N.

YA. N. FEL'D, "Diffraction of plane waves on a semi-infinite lattice of fine conductors." Scientific Session Devoted to "Radio Day", May 1958, Trudrezervizdat, Moscow, 9 Sep. 58

The problem is analyzed of the diffraction of plane electromagnetic waves on a lattice of parallel fine infinite conductors located in a half-plane. The diffracted wave field E is written as the series

(1) $$E = \sum_{n=0}^{\infty} J_n H_n^{(2)}(kR_n),$$

where R_n is the distance from the axis of the n-th conductor to the observation point. The constants J_n are determined from the boundary conditions on the conductor suffaces, which lead in the approximation under consideration (fine rods) to a system of linear equations

(2) $$\sum_{n=0}^{\infty} A_n Z_{m-n} = B_m; \; m \geq 0.$$

Here $A_n = J_n - \Delta_n$ are unknown but Z_n, B_n, Δ_n are known numbers. The solution of a system of this kind reduces to finding a function $f(W) = \sum_{n=0}^{\infty} A_n w^n$ which is holomorphic in the unit circle $(W) \leq 1$.

FEL'D, YA. N.

YA. N. FEL'D, L. S. BENENSON: "Computation of the wave phase velocities in an artificial metallodielectric." Scientific Session Devoted to "Radio Day", May 1958, Trudrezervizdat, Moscow, 9 Sep. 58

A method is presented of computing the phase velocity of waves being propagated in an artificial metal-dielectric. A general derivation is given of the characteristic equation by using the induced emf method. It is shown that the solution of the equation is stationary relative to small changes in the current distribution function on the structure elements. A detailed solution of the equation is given by an example of a three-dimensional lattice of fine metal rods for waves being propagated in one of the axial directions of the lattice. Hence, the problem reduces to an analysis of a linear lattice of rods arranged along an equivalent waveguide withtwo ideally el electric and two ideally magnetic walls.

SOV/109-3-7-3/23

AUTHOR: Fel'd, Ya. N.

TITLE: Diffraction of an Electromagnetic Wave from a Semi-Infinite Grating (Difraktsiya elektromagnitnoy volny na polubesko-nechnoy reshetke)

PERIODICAL: Radiotekhnika i Elektronika, 1958, 3, Nr 7, pp 882-889 (USSR)

ABSTRACT: The semi-infinite grating considered consists of infinitely long linear conductors which are situated in the x - z plane and are parallel to the axis z (see the figure on p 882). The distances between the axes of neighbouring conductors are l and the radius of a conductor is r_o.

The conductors, as counted from the origin in the direction of the axis x, are denoted 1, 2, 3, ... n. The electromagnetic field impinging on the grating is orthogonal to the axis z and its electrical vector is parallel to the axis z. The electric field is expressed by:

$$E^o = E_z^o = e^{-ik(x \cos \varphi + y \sin \varphi)} \qquad (1)$$

where $k = 2\pi/\lambda$, where λ is the wavelength, and φ is

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Diffraction of an Electromagnetic Wave from a Semi-Infinite Grating

the angle between the direction of propagation and the axis x. The primary wave excites currents in the conductors of the grating. These currents are constant along the conductors. The full current of the n^{th} conductor is I_n. It is obvious that the currents I_n produce the secondary field whose electrical vector is parallel to the axis z. On the basis of the principle of the superposition the total secondary field can be expressed by Eq.(2) where E_n is the electrical field excited by the current in the n^{th} conductor which is expressed by Eq.(3). H in Eq.(3) is a Hankel function and R_n is the distance between the n^{th} conductor and the point of observation. If the conductors have an infinite conductivity, the electrical field at their surface should be zero. This boundary condition for the m^{th} conductor can be written in the form of Eqs.(4). Eqs.(4) form an infinite system of linear equations which determine the

Diffraction of an Electromagnetic Wave from a Semi-Infinite Grating

currents I_m. If the notation defined by Eqs.(5) is adopted, Eqs.(4) can be written in the form of Eqs.(4a). The solution for the currents I_n should be in the form of Eqs.(6) where $1/\beta$ is defined by Eq.(6a). From Eqs.(6) and (4a) the relationships between A_n and B_m can be expressed by Eq.(7) where B_m is given by Eq.(7a). Eq.(7) permits the determination of the unknowns A_n and consequently the currents in the conductors. By adopting 3 functions of the complex variable w, as defined by Eqs.(10), the quantities A_n and B_m can be expressed by Eqs.(11) and (13). The functions of Eq.(10) should satisfy Eqs.(15) and (15a). From the above it follows that these functions should also satisfy the conditions expressed by Eqs.(16) and (16a) where $\Phi^-(w)$ is a holomorphic function outside the contour L and $\Phi^+(w)$ is a holomorphic inside the contour L. If now a functional of the type expressed by Eq.(18) is considered, this can be expressed in terms of the function of Eq.(10), and is in the form of Eq.(19). The variation of the functional is expressed by Eq.(21) and its stationary value by

Diffraction of an Electromagnetic Wave from a Semi-Infinite Grating

Eq.(22), If now the function f (w) is given by Eq.(23), such that X_n satisfies the conditions given by Eq.(24), the variation is expressed by the 5th equation on p 887. The polynomial X_n can be written in the form of Eq.(27) and the coefficient c_n in the form of Eq.(26a); from these it follows that A_n is given by Eq.(28). The orthonormal polynomials X_n are given by the determinant of Eq.(29), where the parameters D are expressed by Eq.(30). The first three polynomials are expressed by Eq.(32). The above method of calculation is employed to determine the current in the conductors of a semi-infinite grating for the case

SOV/109-3-7-3/23

Diffraction of an Electromagnetic Wave from a Semi-Infinite Grating

of $\varphi = \pi/2$. The coefficients A_n evaluated on the above basis are shown in the table on p 889. The paper contains 1 figure and 3 Soviet references.

SUBMITTED: January 14, 1958.

1. Electromagnetic waves--Diffraction 2. Electromagnetic waves --Propagation 3. Electric fields--Excitation 4. Electric currents --Performance 5. Mathematics

Card 5/5

SOV/109- -4-3-10/38

AUTHORS: Ya.N. Fel'd, and L.S. Benenson

TITLE: Calculation of the Phase Velocities of the Waves in an Artificial Metallic Dielectric (Raschet fazovykh skorostey voln v iskusstvennom metallodielektrike)

PERIODICAL: Radiotekhnika i Elektronika, Vol 4, Nr 3, 1959, pp 417-427 (USSR)

ABSTRACT: A general method for deriving the characteristic equation for determining the phase velocity of a metal-dielectric system is presented. The system considered is in the form of a three-dimensional grid containing metallic elements. It is assumed that the waves propagate along one of the axes of the grid, e.g. axis z. The overall surface area of the elements of the grid is $S = \sum_n S_n$, where S_n is the area of the n-th element. A wave propagating along axis z induces a surface current of density $\vec{K}$ on the surface of the elements. The total field in the system is, therefore, in the form of an integral operator of the current $\vec{K}$, that is $\vec{E} = \vec{E}(\vec{K})$. If the current at the zero element is $\vec{K} = A\vec{\psi}$, the current at an arbitrary element is expressed by Eq (2) where h is the wave number and f(n) is the unknown function of n, which

Card 1/4

Calculation of the Phase Velocities of the Waves in an Artificial Metallic Dielectric

is identical for all the elements lying in the same plane z = const; A is a constant. The characteristic equation for the phase velocity can be written as:

$$\int_{S_n} \vec{K}^* \, E \, \{\vec{K}\} \, dS = 0 \quad . \tag{3}$$

By substituting Eq (2) in Eq (3), the latter can be written as Eq (4) where $\mathfrak{L}$ is given by Eq (4a). Eq (4) can be used to evaluate the phase velocity in an artificial metal-dielectric. In particular, it can be employed to evaluate the velocity in the system shown in Fig (1); this is in the form of a rectangular three-dimensional lattice formed of metal stubs having a length ℓ and a radius a ; the spacings between the stubs in the three directions are L_x , L_y and L_z . For this case, Eq (4) is in the form of:

$$|A|^2 e^{ihf(o)} \int_{S_o} \vec{\psi} \sum_n e^{-ihf(n)} \vec{E}_n \{\vec{\psi}\} \, dS = 0 \tag{13}$$

Card 2/4 This can also be written as Eq (13a) or Eq (15), where Z_n

Calculation of the Phase Velocities of the Waves in an Artificial Metallic Dielectric

is defined by Eq (14). This can further be transformed into Eq (17) where Z_{ox} is defined by Eq (16). Z_{ox} is the impedance induced into the zero stub by all the stubs situated in the plane z = constant. The impedance Z_{ox} can be evaluated from Eq (18), or Eq (20). It can also be written in the form of Eq (24), where N is defined by Eq (21) while f is given by Eq (22); the parameter γ_p is the propagation constant of the p-wave in a waveguide which is equivalent to a two-dimensional lattice shown in Fig 2. The resistance of a single stub in the equivalent waveguide is given by Eq (25). On the basis of the above expressions it is shown that the characteristic equation of the system is in the form of Eq (32), where X(h) is given by Eq (31); in these equations $\gamma_1 = k$ and $\gamma_p = i\alpha_p$. By analysing Eq (32) it is found that the region of the transmission of the waves through the lattice is defined by Eq (41); the boundaries of the transmission region can be found from Eq (42). Eq (32) was also used to evaluate the values of $hL_z = \alpha(k)L_z$ for various R_{00}/X_{00}. The

Card 3/4

Calculation of the Phase Velocities of the Waves in an Artificial Metallic Dielectric

resulting graphs are shown in Fig (3). These do not take into account the existence of the attenuated eigen-waves. The values of similar functions which take into account the higher-order waves are plotted in Fig (4). From Fig (4) it is seen that the existence of the higher-order waves may lead to a substantial change of the phase constant.

Card 4/4 There are 5 figures, an Appendix and 7 references, 4 of which are Soviet and 3 English.

SUBMITTED: November 6, 1957

FRADIN, Afroim Zelikovich; RYZHKOV, Yevgeniy Vasil'yevich; FEL'D, Ya.N., doktor tekhn. nauk, retsenzent; GRAUDE, B.V., doktor tekhn. nauk, otv. red.; NOVIKOVA, Ye.S., red.; MARKOCH, K.G., tekhn. red.

[Measurement of the parameters of antenna-feeding devices] Izmerenie parametrov antenno-fidernykh ustroistv. Moskva, Sviaz'izdat, 1962. 315 p. (MIRA 15:8)
(Antennas) (Radio lines) (Wave guides)

S/109/62/007/001/006/027
D201/D301

I4, 2500

AUTHOR: Fel'd, Ya.N.

TITLE: Variational methods of calculating parameters which are the linear functionals of integrals of electrodynamics equations

PERIODICAL: Radiotekhnika i elektronika, v. 7, no. 1, 1962, 53-60

TEXT: The author proposes a general method of determining functionals which are stationary for the functions coinciding with the solution of a given linear operator equation of type

$$Gu = f \qquad (1)$$

in which G - a linear operator, determined over a certain class A of vectorial functions; u - the sought solution in the above class A; f - a given external "force" (of the same class). The stationary values of these functionals may be made equal to any given parameter which again is the linear functional of the solution of the operator equation. This is a generalization of results obtained by L. A. Vaynshteyn (Ref. 2: ZhTF, 1961, 31, 1, 29) in that it can be

Card 1/2

applied to equations with assymmetrical (nonconjugate) operators and to the Hibert matrices. The method can also be applied for approximately evaluating various parameters and as an example the problem is solved for the stationary expression of the directive gain of a system of currents. It is stated in conclusion that the method described is most suitable for applications to problems of electrodynamics and of the antennae theory. There is 1 figure and 7 references: 6 Soviet-bloc and 1 non-Soviet-bloc.

SUBMITTED: August 19, 1961

Card 2/2

S/109/63/008/002/001/028
D266/D308

AUTHORS: Fel'd, Ya.N. and Bakhrakh, L.D.

TITLE: The present state of antenna synthesis theory

PERIODICAL: Radiotekhnika i elektronika, v. 8, no. 2, 1963, 187-205

TEXT: The purpose of the paper is to present most of the fundamental approaches to the synthesis of radiation patterns. Linear antennas, rectangular and circular apertures and linear arrays are reviewed. The second section is concerned with the approximation of the given radiation pattern by realizable functions (method of 'partial' radiation patterns). The phenomenon of superdirectivity is treated in the third section. Section 4 is concerned with radiation patterns which are optimum in the sense that they give the highest gain for given side lobe level. Section 5 deals with the problem of antennas which scan so fast that the radiation pattern is affected by it. The class of realizable functions is given. In conclusion, the authors suggest a number of synthesis problems awaiting solution,

Card 1/2

S/109/63/008/002/001/028
D266/D308

The present state ...

e.g. to realize a given radiation pattern by a curved aperture or by currents flowing in a given volume. There are 4 figures and 34 references.

SUBMITTED: July 26, 1962

Card 2/2

LITVINENKO, O.N.; SOSHNIKOV, V.I.; FEL'D, Ya.N., prof., retsenzent;
AYZINOV, M.M., prof., retsenzent; KOCHETKOVA, N.A., red.

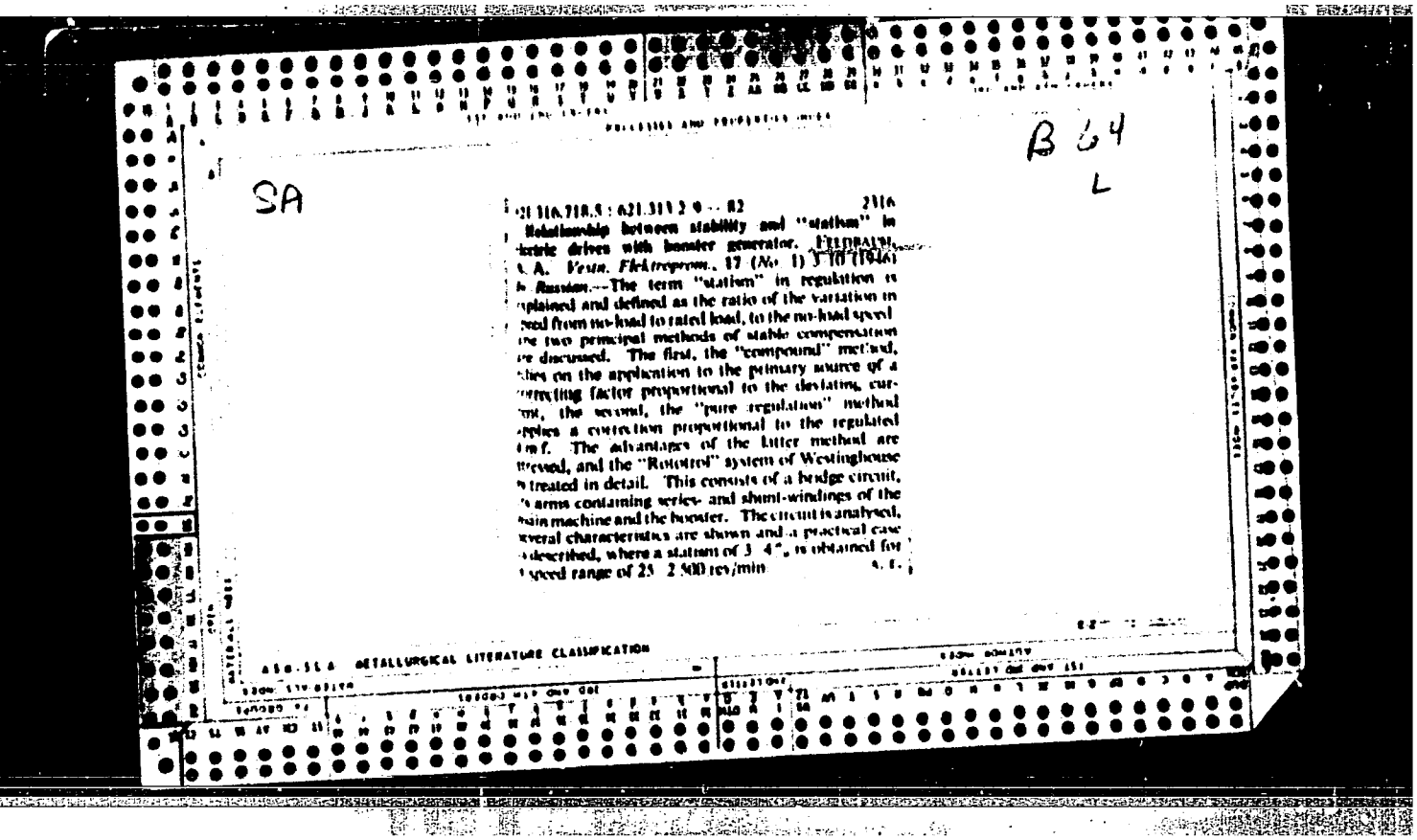
[Theory of nonuniform lines and their use in radio engineering] Teoriia neodnorodnykh linii i ikh primenenie v radiotekhnike. Moskva, "Sovetskoe radio," 1964. 535 p.
(MIRA 17:6)

FEL'D, Ya.N.

Diffraction of an electromagnetic wave on double semi-infinite nonsymmetrical arrays. Radiotekh. i elektron. 9 no.6:950-959 Je '64. (MIRA 17:7)

FEL'DBARG, I.M., inzh.; KULIYEV, G.R., inzh.

Elimination of vibration of a synchronous compensator with an accelerating motor. Elek. sta. 33 no.6:78 Je '62. (MIRA 15:7)
(Electric substations--Equipment and supplies)
(Electric machinery--Vibration)



SA

B 64
L

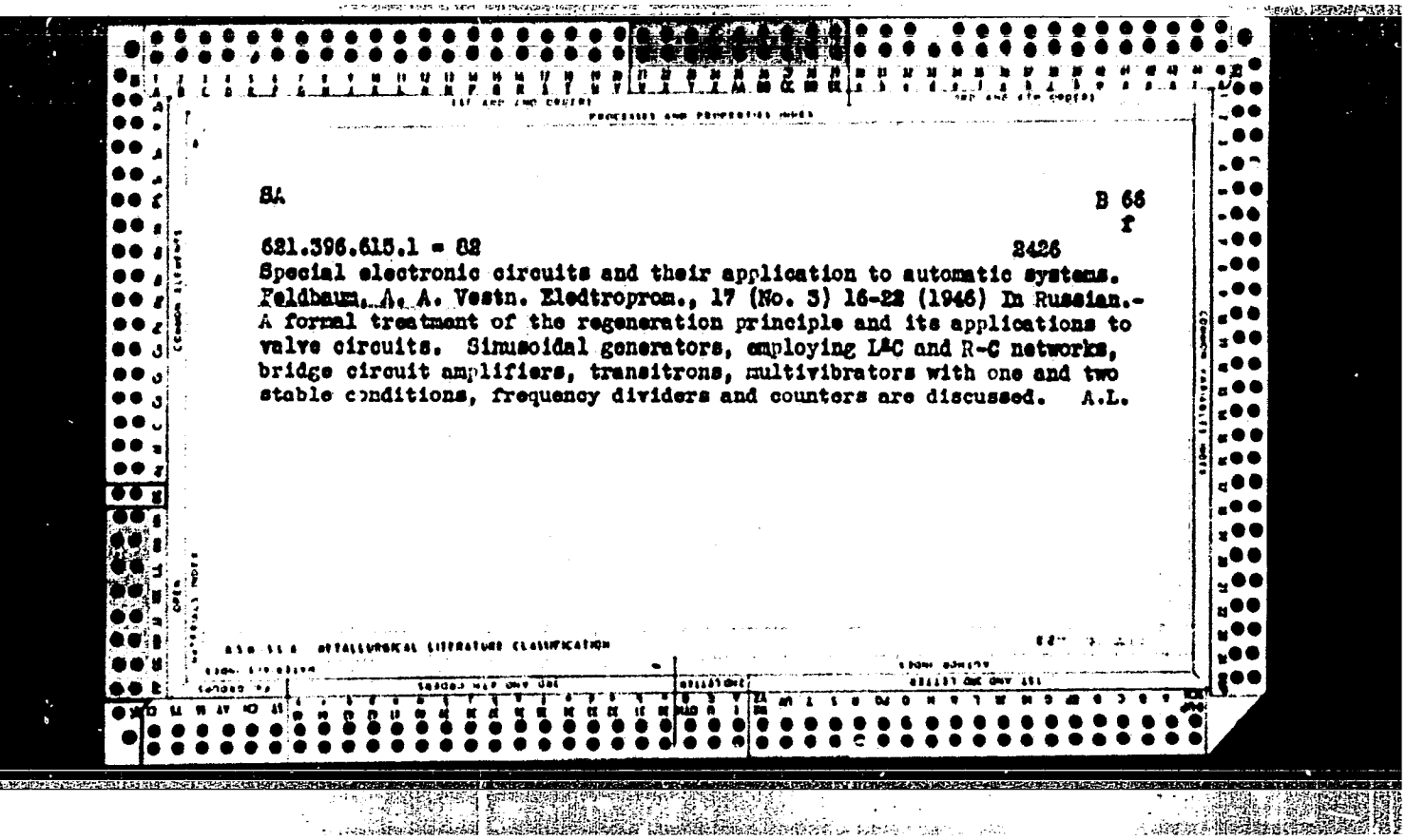
[21] 116.718.8 : 621.313.2 0 -- 82 2116

Relationship between stability and "statism" in electric drives with booster generator. [TITLE TRANSL.]

L. A. *Vestn. Elektropromm.*, 17 (No. 1) 3-10 (1946)

In Russian.—The term "statism" in regulation is explained and defined as the ratio of the variation in speed from no-load to rated load, to the no-load speed. The two principal methods of stable compensation are discussed. The first, the "compound" method, relies on the application to the primary source of a correcting factor proportional to the deviating current, the second, the "pure regulation" method applies a correction proportional to the regulated emf. The advantages of the latter method are proved, and the "Rototrol" system of Westinghouse is treated in detail. This consists of a bridge circuit, the arms containing series- and shunt-windings of the main machine and the booster. The circuit is analyzed, several characteristics are shown and a practical case is described, where a statism of 3–4%, is obtained for a speed range of 25–2 500 rev/min. A. F.

A56-51A METALLURGICAL LITERATURE CLASSIFICATION



8A B 65
f

621.396.615.1 = 82 8426

Special electronic circuits and their application to automatic systems. Feldbaum, A. A. Vestn. Elektroprom., 17 (No. 3) 16-22 (1946) In Russian.- A formal treatment of the regeneration principle and its applications to valve circuits. Sinusoidal generators, employing L-C and R-C networks, bridge circuit amplifiers, transitrons, multivibrators with one and two stable conditions, frequency dividers and counters are discussed. A.L.

Fel'dbaum, A.A.

Certificates Awarded for Certain Classes of Soviet Inventions as Reported by Monthly Bulletin of Inventions, 1948-49. Izvestiya Byulleten' [illegible], Monthly Bulletin of Inventions, Moscow Issue No. 12 Dec 1949 [illegible], No Trans. No. 548, 10 May 1956, For Official Use Only

Class 42b, 12_{04}. No 78630 (2039/359807 of 11 August 1947). Registered with the Ministry of Electric Industry USSR

DEVICE FOR AUTOMATICALLY CONTROLLING AND SORTING ARTICLES

A. A. Fel'dbaum

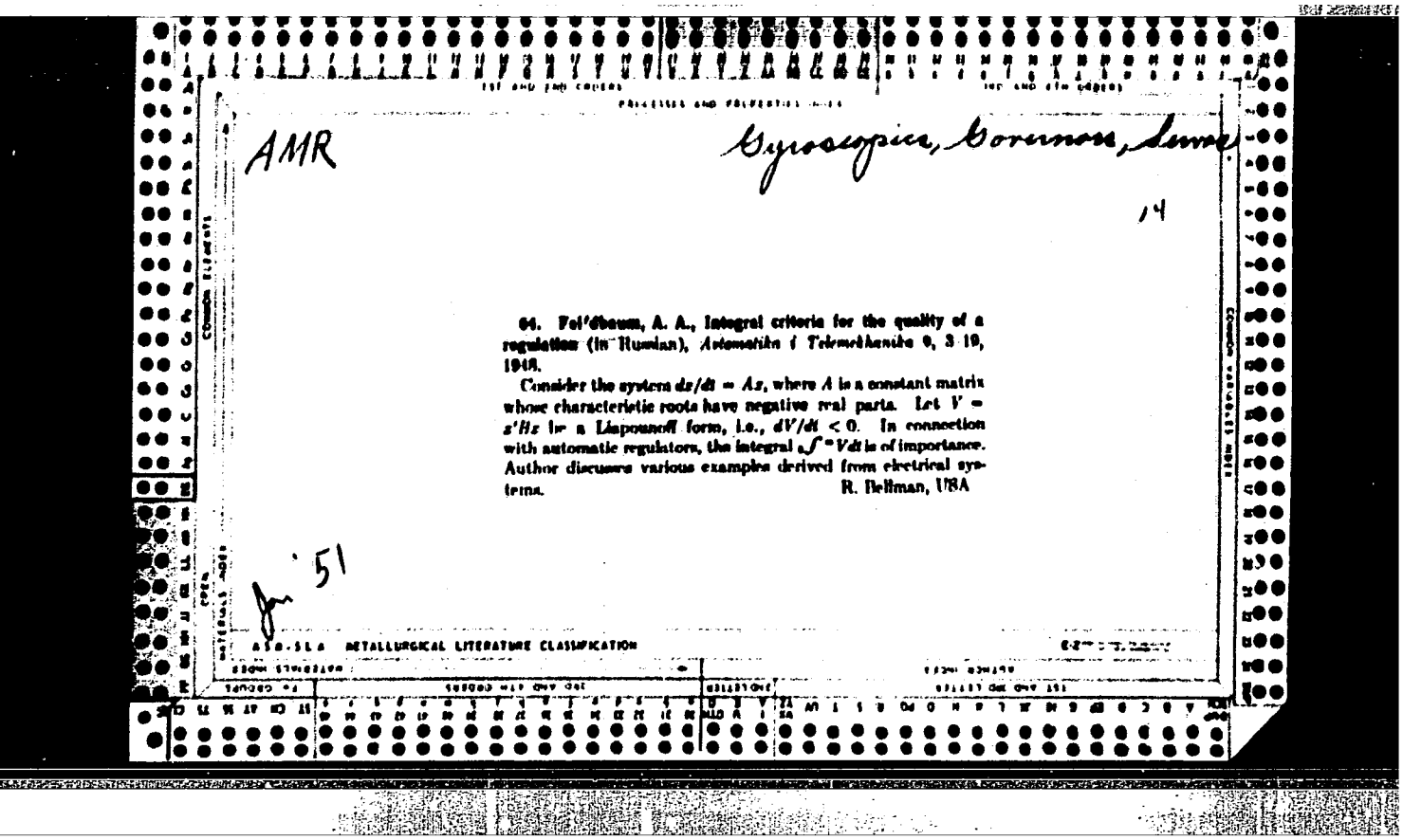
The invention item is: 1. A device for automatic control and sorting of articles by size, using an electric differential inductive measuring device, whose windings are connected in two adjacent arms of an a-c bridge. Its distinguishing feature is the use of two biased reactance coils in the same arms of the bridge. The bias windings of these coils are intended to be connected to the chokes of the bridge through a suitable amplifier. The purpose of this arrangement is to balance the bridge automatically by varying the inductive reactance of its arms. (Total points: 2)

FEL'DBAUM, A.A.

SHCHUKIN, A.I., kandidat tekhnicheskikh nauk; FEL'DBAUM, A.A., kandidat tekhnicheskikh nauk.

Apparatus for precision control of dimensions by the induction method. Vest.elektroprom. 18 no.5:22-24 '47. (MLRA 6:12)
(Electric controllers)

1. Vsesoyuznyy elektrotekhnicheskiy institut.



AMR

Gyroscopics, Governors, Servo

14

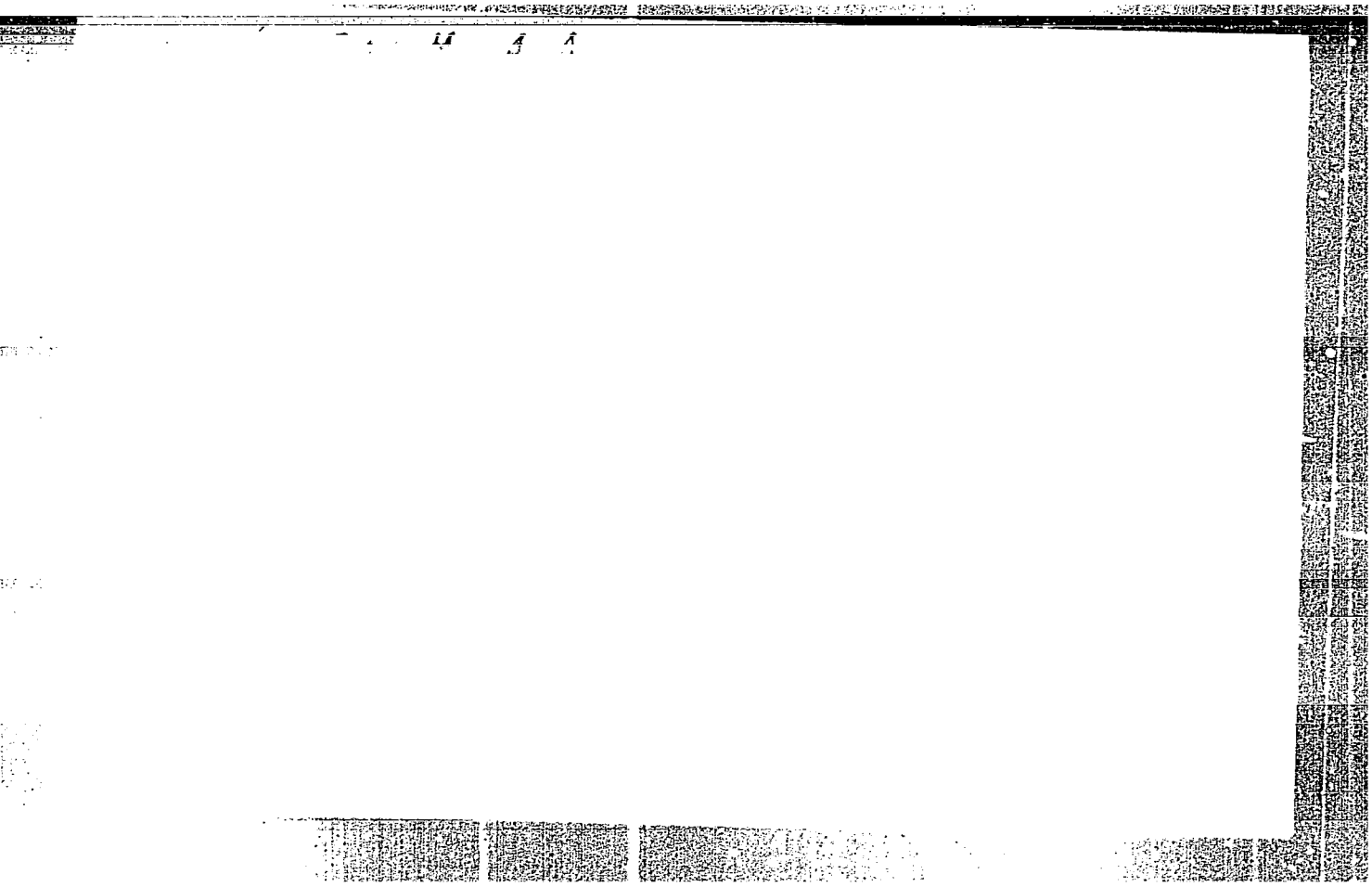
64. Fel'dbaum, A. A., Integral criteria for the quality of a regulation (in Russian), *Avtomatika i Telemekhanika* 9, 3-19, 1948.

Consider the system $dx/dt = Ax$, where A is a constant matrix whose characteristic roots have negative real parts. Let $V = x'Hx$ be a Liapounoff form, i.e., $dV/dt < 0$. In connection with automatic regulators, the integral $\int_0^\infty V dt$ is of importance. Author discusses various examples derived from electrical systems.

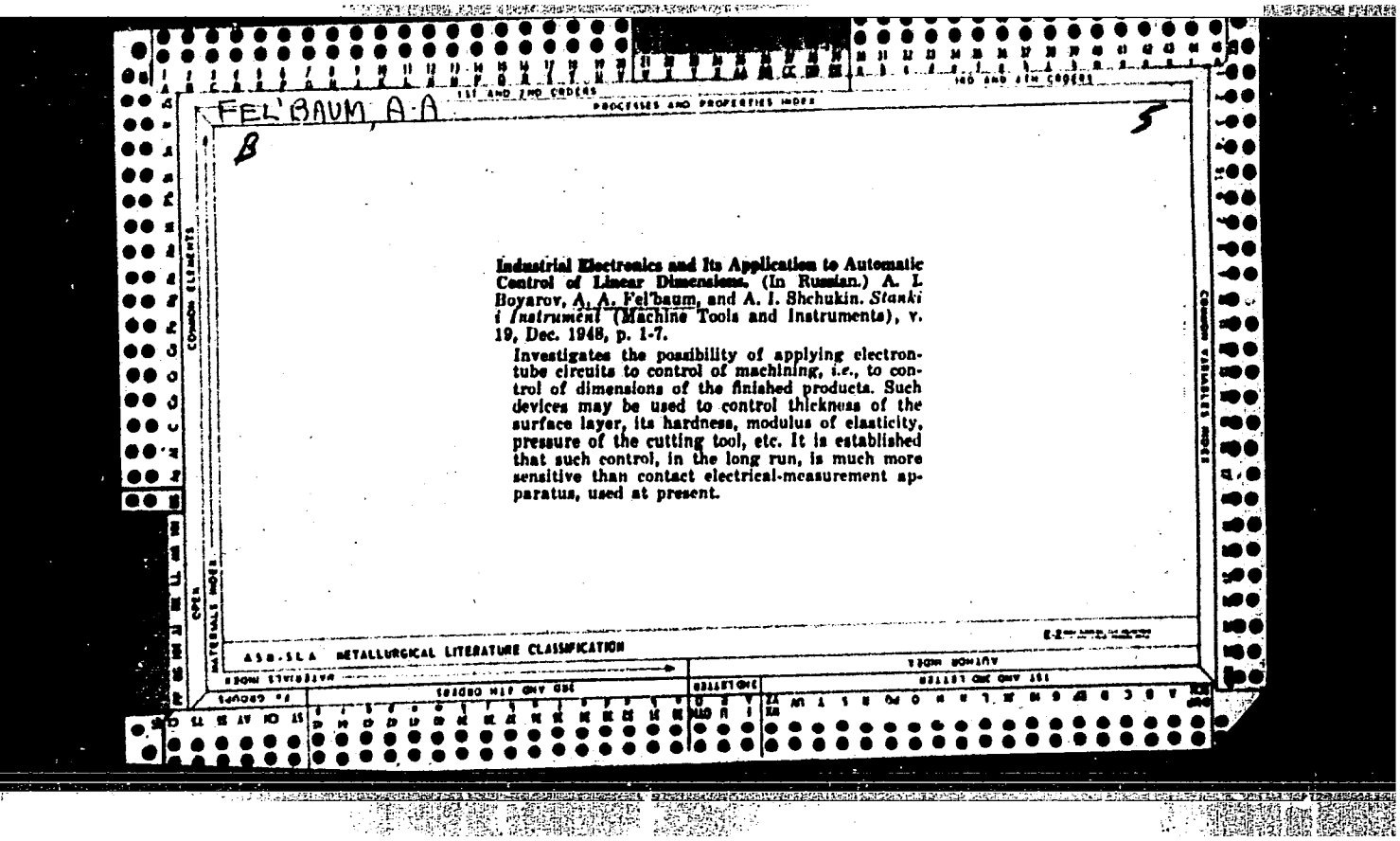
R. Bellman, USA

'51

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000412820(



FEL'BAUM, A.A

B

5

Industrial Electronics and Its Application to Automatic Control of Linear Dimensions. (In Russian.) A. I. Boyarov, A. A. Fel'baum, and A. I. Shchukin. *Stanki i Instrument* (Machine Tools and Instruments), v. 19, Dec. 1948, p. 1-7.

Investigates the possibility of applying electron-tube circuits to control of machining, *i.e.*, to control of dimensions of the finished products. Such devices may be used to control thickness of the surface layer, its hardness, modulus of elasticity, pressure of the cutting tool, etc. It is established that such control, in the long run, is much more sensitive than contact electrical-measurement apparatus, used at present.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

FEL'DBAUM, A. [A.]

USSR/Weapons
Artillery
Remote Control

Jul/Aug 49

"Conclusions on V. A. Besekerskiy's Book, 'Remote Control of Artillery Units,'" A. Mikhaylov, D. Mar'yanovskiy, A. Fel'dbaum, 4 pp

"Avtomat i Telemekh" Vol X, No 4

Authors were appointed by editors of publication to settle dispute as to merits of subject book. They agreed with original review which was very unfavorable. Mistakes in subject matter, faulty selection, and presentation are listed.

PA 51/49T105

USSR/Electronics Jul/Aug 49
Relays
Regulation

"Simplest Relay System of Automatic Regulation,"
A. A. Fel'dbaum, 18 pp

"Avtomat i Telemekh" Vol X, No 4

Studies influence of coefficient of recovery and feedback on stability of a relay system of the second order. Compares transition process in relay and linear systems of the second order. Relay systems of automatic regulation have advantage over linear systems of a shorter regulation time. Instability of a system is possible when coefficient of recovery of the relay is less than one. This can be eliminated by using feedback. Submitted 26 May 48.

51/49T25

FEL'DBAUM, A. A.

DOC. TECH. SCI.

FEL'DBAUM, A.A.

Dissertation: "Methods for Investigating Transient Processes in Self-Adjusting Systems."

25 March 49
Inst of Automatics and Telemechanics, Acad Sci USSR.

SO Vecheryaya Moskva
Sum 71

D1(i).R

FEL'DBAUM, Aleksandr Aronovich
Engineer.

Stalin prize 2-nd class together with 5 co-workers for his work in construction of apparatus.

Source: Laureaty Stalinskikh Premiy za 1950 god, p. 27.
No portrait.

P-6404

USSR/Electricity - Servomechanisms Jul 51
Regulation, Automatic

"Investigation of the Dynamics of Automatic Regulation Systems by the Method of a Generalized Integral Criterion," Docent A. A. Fel'dbaum, Cand Tech Sci, Moscow

"Elektrichestvo" No 7, pp 18-25

Sets forth a method for the selection of the parameters of an automatic regulation system in which the transient curve is close to any one of the family of assigned curves. The soln is obtained by the application of integral criteria and the

199T16

USSR/Electricity - Servomechanisms (Contd) Jul 51

variational method. The example discussed is a position regulation system, described by a 3d order eq. Bibliography lists 13 Russian sources, mostly on automatic regulation. Submitted 11 Nov 50.

199T16

FEL'DBAUM, A. A.

FEL'DBAUM, A. A.

"Optimum Processes in Systems of Automatic Regulation", Avtomatika i Telemekhanika, Vol 14, No 6, 1953, pp 712-728.

The optimum process for a closed system with an external setting action is determined in a way that the time of the transient process be a minimum at specified limiting of the modulus of the derivative of the controllable magnitude in time of one or another order or for a linear combination of these derivatives.

States what information on the external setting action should be available. Certain considerations on the design of an auxiliary circuit, added to the regular circuit of a closed system for the realization of the specified optimum process, are specified.

The class of discussed systems is limited because the setting action is taken in the pure form without consideration of the disturbing reactions of the system and interferences. For many systems the concept of optimum process itself may be other than that assumed in this paper. (RZhMekh, No 11, 1954) SO: SUM. No. 443, 5 Apr. 55

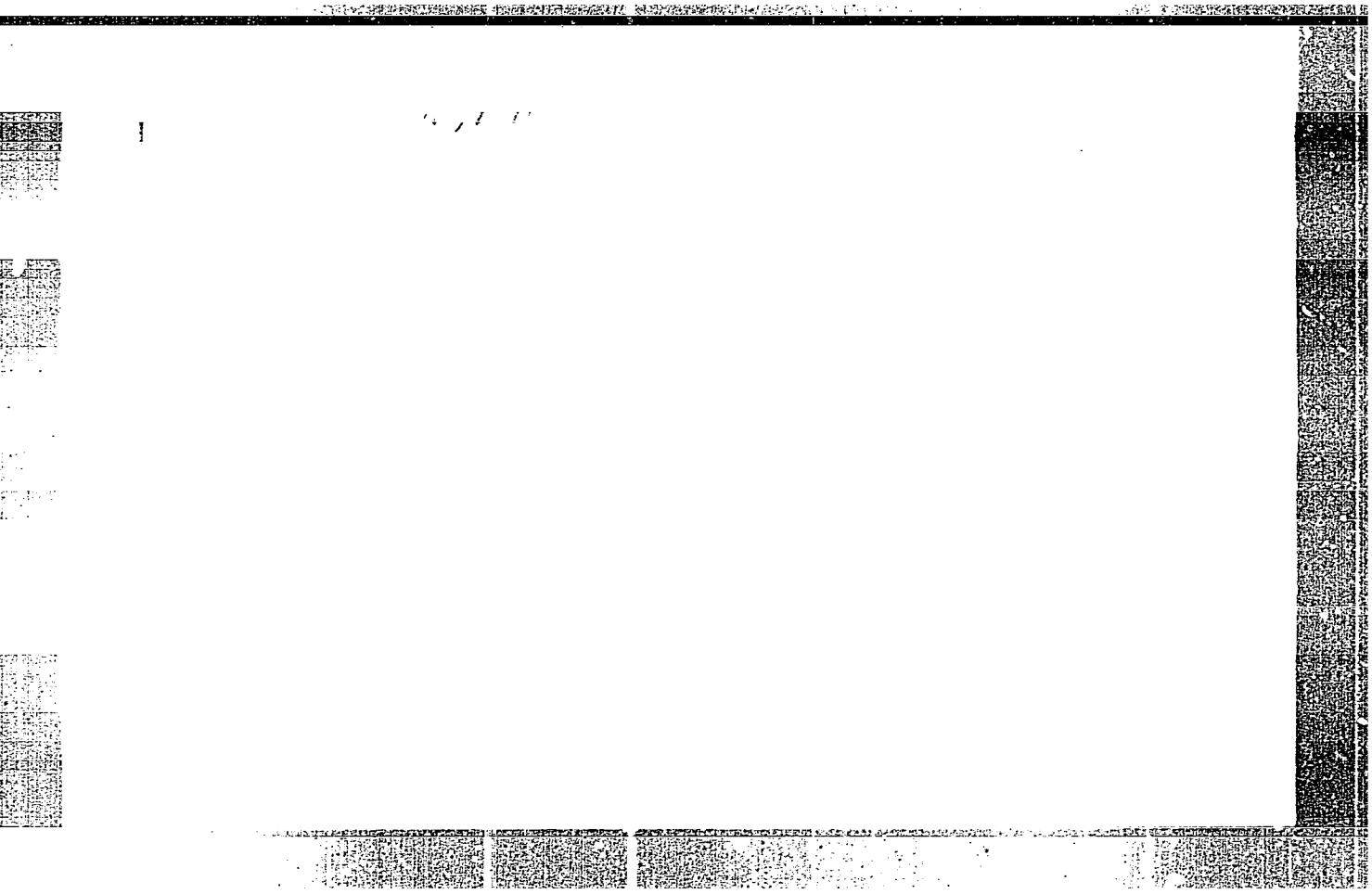
FEL'DBAUM, A.A.; BOGOMOLOVA, M.F., redaktor; ZUDAKIN, I.M., tekhnicheskiy redaktor

[Electrical automatic control systems] Elektricheskie sistemy avtomaticheskogo regulirovaniia. Moskva, Gos. izd-vo oboronnoi promyshl., 1954. 785 p. (MLRA 8:7)
(Automatic control)

BLOKH, Z.Sh., doktor tekhnicheskikh nauk, professor, redaktor; FEL'D-BAUM, A.A., doktor tekhnicheskikh nauk, retsenzent; POPOVA, S.M., tekhnicheskiy redaktor.

[Calculations and analysis of automatic control systems for machinery collected scientific works] Raschet i analiz sistem avtomaticheskogo regulirovaniia mashin; sbornik nauchnykh rabot. Pod red. Z.Sh.Blokh. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroitel'noi lit-ry, Vol. 7. 1954. 174 p. (MLRA 8:2)

1. Moscow. Moskovskiy inzhenerno-fizicheskiy institut.
(Automatic control)



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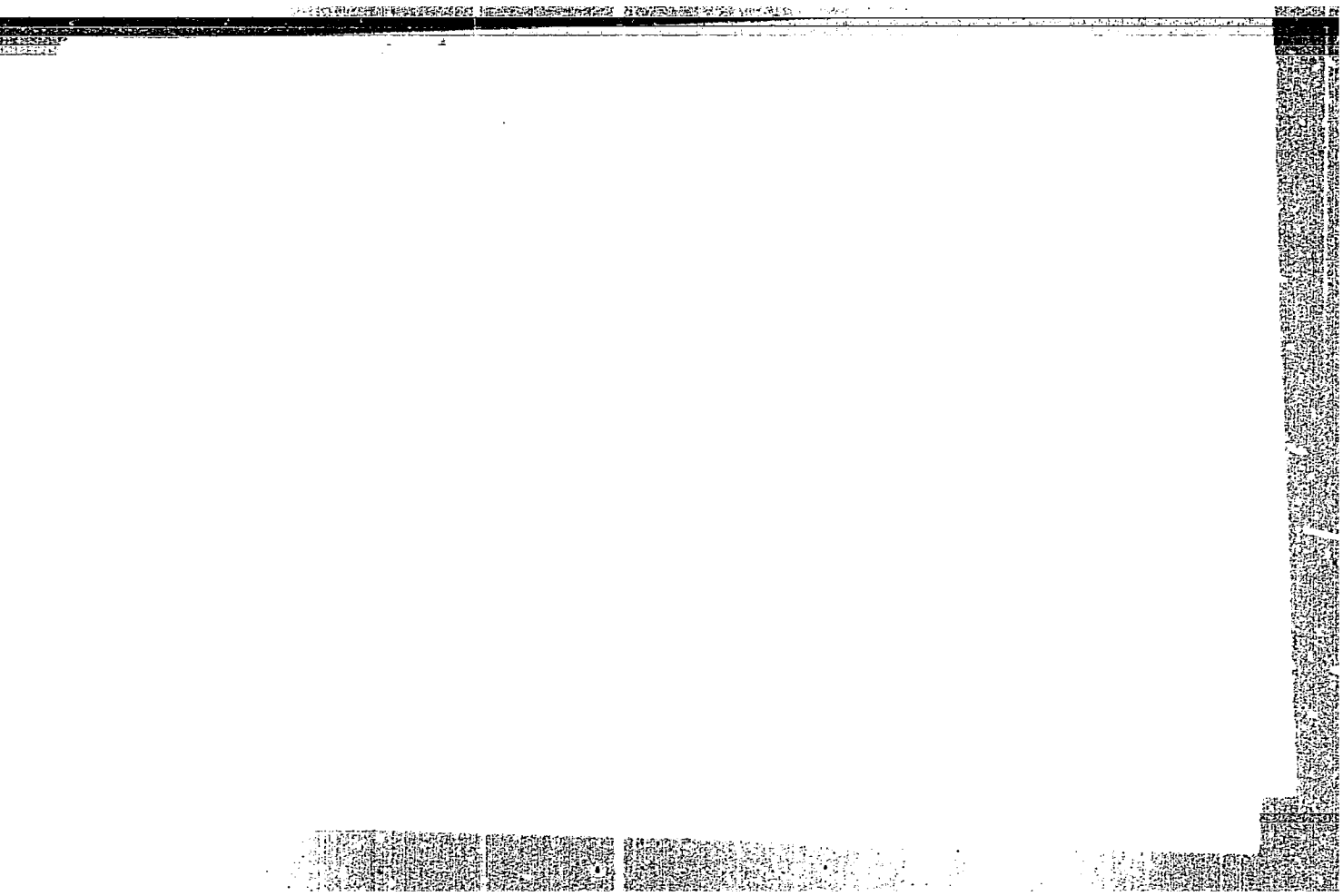

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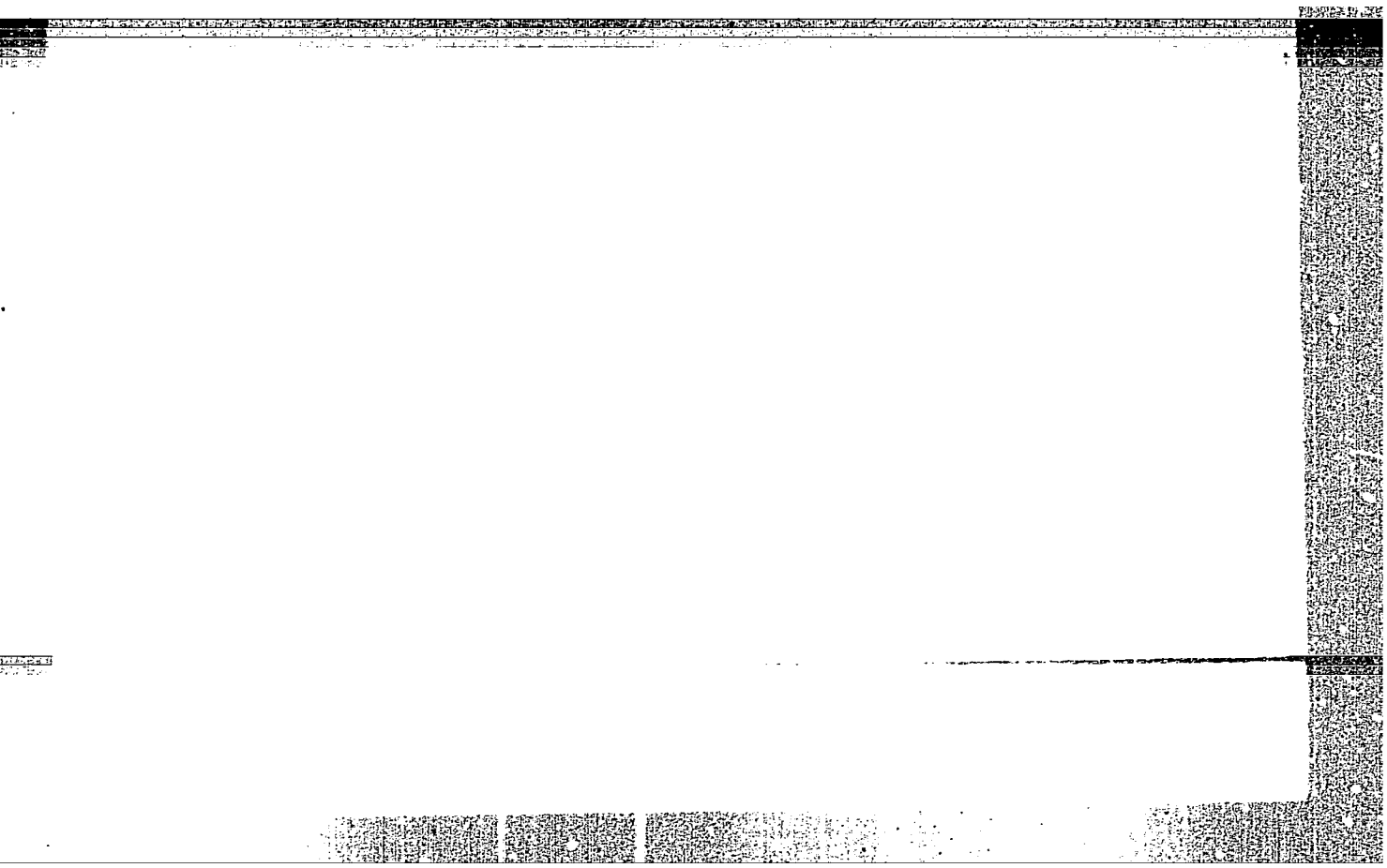

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000412820

ONUFRIYUK, S.P. (Moskva); FEL'DBAUM, A.A. (Moskva)

An electronic analog for backlash computation. Avtom. i. telem. 17 no.6:513-523 Je '56. (MLRA 9:10)

(Automatic control--Models)

FEL'DBAUM, A. A., Dr. of Tech. Sci.

"Possibilities of Employing Computation Technique for Automatization of Production Processes in Metallurgy" a paper presented at the Conference on Methods of Development of Soviet Mathematical Machine-Building and Instrument-Building, 12-17 March 1956.

Translation No. 596, 8 Oct 56

APPROVED FOR RELEASE: Monday, July 31, 2000 CIA-RDP86-00513R000412820

FEL'DBAUM, A.A.

"On the Application of Computers in Automatic Control Systems, by A. A. Fel'dbaum, Avtomatika i Telemekhanika, No 11, Nov 56, 1046-1056

Drawing from 15 Western and 11 Soviet sources, the paper presents a review and a classification of computer application trends in automatic systems.

Some tendencies in the development of automatic systems and general problems of their theory and construction were considered.

SUM. 1287

Call Nr: TJ212.A425T.2

Session of the Academy of Sciences, USSR, on Scientific Problems of the Automation of Production on October 15-20, 1956 (cont)

IZDATEL'STVO, Akad. Nauk SSSR, Moscow 1957, 334 pp.

*The article discusses systems capable of automatic adjustment to continuously changing environment. Mention is made of Batkov, A.M., Aspirant. There are 14 references, 6 of which are Soviet, 7 English, and 1 a translation into Russian.

Stebakov, S.A. Discussion of the Reports 167-168

Fel'dbaum, A.A. Principal Trends in the Development of Computing Devices for Automatic Systems 169-184

There are 15 references, 7 of which are Soviet, 6 English, and 2 are translations into Russian.

Fel'dbaum, A.A Statements: Answers to Questions 184-189

Discussion of the Reports of Pugachev, V.S., Solodovnikov, V.V. and Fel'dbaum, A.A. 190-209

Card ~~10/14~~ 1/2

Call Nr: TJ212.A425T.2

Session of the Academy of Sciences, USSR, on Scientific Problems of the Automation of Production on October 15-20, 1956 (cont)

The following additional personalities spoke on these reports: Sitnikov, V.V., Kilin, F.M., Batkov, A.M. and Ryabov, B.A. Two references, both Soviet, are listed with the statement of Meyerov, M.V.

Ivakhnenko, A.G. Automatic Control Systems with Logical Action Elements 210-230

Additional personalities whose work is mentioned include: Zusman, V.G., Vul'fzon, I.A., Gol'dfarb, L.S., Popov, Ye. P., Ryabov, B.A. and Kuntsevich, V.M. There are 8 references, 5 of which are Soviet and 3 English.

Discussion 231-232

Fel'dbaum, A.A.

Card ~~3/4~~ 3/2

FEL'DBAUM, A. A.,

"Basic Trends in the Working out of Computing Apparatus for Automatic Systems,"

paper read at the Session of the Acad. Sci. USSR, on Scientific Problems of Automatic Production, 15-20 October 1956.
Avtomatika i telemekhanika, no. 2, p. 182-192, 1957.

9015229

FEL'DBAUM, Aleksandr Aronovich; POSPELOV, G.S., doktor tekhnicheskikh nauk, retsenzent; BOGOMOLOVA, M.F., izdatel'skiy redaktor, ROZHIN, V.P., tekhnicheskiy redaktor

[Electric automatic control systems] Elektricheskie sistemy avtomaticheskogo regulirovaniia. Izd. 2-oe. Moskva, Gos. izd-vo obor. promyshl., 1957. 806 p. (MIRA 10:7)
(Automatic control)

FEL'DBAUM, A.A.

AUTHORS: Manukhin, A.I., Fel'dbaum, A.A. and Fitsner, L.N. 120-4-9/35

TITLE: Non-linear Function Generators with Two Inputs (Nelineynyye preobrazovateli s dvumya vkhodami)

PERIODICAL: Pribory i Tekhnika Eksperimenta, 1957, No.4, pp. 33 - 38 (USSR)

ABSTRACT: The design of a two-input, non-linear function generator which produces an output $y = f(x_1 x_2)$, where x_1 and x_2 are the input voltages is given. The principles of operation and the results of tests on the circuits are described. Change from one function to another is not complicated and is obtained by a system of hand controls.

In the electronic relay circuit, the function of one independent variable is formed by use of identical diode stages. Each stage includes a voltage divider and several potentiometers which are connected by two-pole switches to either the anode or the cathode of the diode to enable both positive and negative values to be handled. One of the arms of each voltage divider is connected to a constant voltage E (or -E). The second arm of the dividers is connected to one of the input voltages x_1 (or x_2). The impedances of the dividers in the different stages

Card1/3

are arranged so that the diodes conduct at determined values of the input voltage x_1. These values are the limits of the increments over which the function is considered linear. The voltages from the wipers of the potentiometers are passed to summing amplifiers Y_1 and Y_2. By arranging the wipers of the potentiometers, each of the amplifiers forms the functions $f_i(x_1)$ and $f_{i+1}(x_1)$. A voltage dependent on the value of the second variable x_2 and proportional to the function $f_i(x_1)$ obtained from the diode generator is switched to the output of the apparatus. This switching is obtained by a series of triggers. To ensure linear increment approximation for x_2, a third amplifier Y_3 and a block product (BP) are used. At the output of the amplifier Y_2 is obtained the difference between the voltages proportional to $f_i(x_1)$ and $f_{i+1}(x_1)$ at the ends of an increment of x_2. This difference is connected to the input of the BP. The second factor of the BP is

proportional to:

$$\frac{\bar{x}_2}{\left[(x_2)_k - (x_2)_{k+1}\right]} .$$

The denominator of this expression equals the value of the increment of x_2. The numerator $\bar{x}_2$ is proportional to the change of x_2 in the interval $(x_2)_k - (x_2)_{k+1}$. This value is equal to the difference between the continuous value of the voltage x_2 and its preceding fixed value $(x_2)_k$ at the boundary of the corresponding increment. The difference is obtained by an amplifier at the input of which is applied $-x_2$ and $(x_2)_k$. Connection of the value $(x_2)_k$ is realised by the relay contacts which simultaneously switch the voltages proportional to the functions $f_i(x_1)$.

There are 13 figures and 9 references, 8 of which are Slavic.

SUBMITTED: September 19, 1956.
AVAILABLE: Library of Congress

Fel'dbaum, A.A.

AUTHORS: Medvedev, L.V., Fel'dbaum, A.A., Fitsner, L.N. (Moscow) 103-10-3/10

TITLE: The Non-Linear Function Generator Possessing Only One Input. (Nelineynyye preobrazovateli s odnim vkhodom)

PERIODICAL: Avtomatika i Telemekhanika, 1957, Vol. 18, Nr 10, pp. 899-910 (USSR)

ABSTRACT: The possibilities for the construction of a non-linear electron transformer with one input are investigated. The results of the elaboration of the basic types of non-linear transformers: combind with diodes, with diodes and triodes, and with compensation are given. The working method of this device and a description of the NP-1 apparatus are given. This is the result of a long development and it has shown positive results. The securing of greater exactness, stability and the extension of the class of the reproduced curves was solved by the introduction of the compensation principle. In the case of less severe requirements NP-1 should be used with diodes. However, if curves with great slopes and strong salient points are to be reproduced, it is more profitable to use NP-1 with diodes and triodes or combined NP-1. In special cases where increased stability is demanded at a small number of partly linear approximation intervals schemes with pure com-

Card 1/2

The Non-Linear Function Generator Possessing Only One Input. 103-10-3/10

pensation can be used. There are 10 figures and 11 Slavic references.

SUBMITTED: July 16, 1956

AVAILABLE: Library of Congress

Card 2/2

AUTHOR: Fel'dbaum, A. A. (Moscow)

TITLE: An Automatic Optimizer (Avtomaticheskiy optimizator)

103-19-8-5/11

PERIODICAL: Avtomatika i telemekhanika, 1958, Vol. 19, Nr 8, pp 731 - 743 (USSR)

ABSTRACT: In this paper the problem is posed of constructing an automatic device which minimizes a function of several variables $Q(x_1, \ldots, x_n)$ subject to additional limitations $H_j(x_1, \ldots, x_n) \leqslant 0$ $(j = 1, \ldots, m)$. Two methods for the built-up of the automatic optimizer are investigated: The gradient method and the method of fastest triggering (Ref 3). As the first method yields the least stabilized mean deviation from the minimum and provides for a better observation of the slowly shifting minimum, the work in the described apparatus is conducted according to the gradient method with small deviations from the minimum. Variants for the diagrams of an optimizer without limitations are investigated: 1) The rough and the exact determination of every line $M_i M_{i+1}$ interchange. 2) The magnitude of the

Card 1/2

An Automatic Optimizer

step width, which can be determined from the value of $\zeta = \sum_{i=1}^{n} |\partial Q/\partial x_i|$ previous to each operational step. The automatic optimizer consists of two parts: The operation and the control block. It is advantageous to realize the first on the basis of computer devices with a continuous mode of operation and the second on the basis of computer devices with a discrete mode of operation. Variants for both blocks are given. In the last section the automatic optimizer with limitations, as mentioned above, is described. There are 9 figures and 6 references, 4 of which are Soviet.

SUBMITTED: December 12, 1957

1. Mathematical computers--Design

SOV/105-19-9-2/1

AUTHORS: Velershteyn, R. A., Fel'dbaum, A. A. (Moscow)

TITLE: Development of an Approximately Optimum System by Means of an Electronic Simulator (Razrabotka pri pomoshchi elektronnoy modeli skhemy sistemy, blizkoy k optimal'noy)

PERIODICAL: Avtomatika i telemekhanika, 1958, Vol 19, Nr 9, pp 824-835 (USSR)

ABSTRACT: The problem to be solved by the automation control system of a continuously operating cold-rolling mill is to guarantee the constant thickness of the rolled stock at the end of the rolling mill. The main cause for the fluctuations in thickness at the withdrawal end is the different thickness of the rolled stock arriving at the rolling mill. Here means and ways for an optimum increase of the rapid action of a system with electric drive on the grounds of an increase in the efficiency of the drive and on the grounds of an approach of the system to an optimum system with respect to rapid action was investigated. Here such a possibility based on a few simple considerations is described which can be carried out by means of an electronic simulator. The method here suggested makes use of the theory of optimum systems of lower order for building up systems of higher order. The an-

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vestigation of the model showed that by means of this method systems approximately equal to optimum systems can be built up. In the most complicated case the method must be completed by some physical ideas. The method is illustrated by an example. It consists in dividing the given part of the system into elements; for each element a simple optimum control part is built up. The input sensitivity of the element is adjusted so that the difference between its actual and optimum value tends towards zero. - The scheme and the selection of optimum values for the scheme parameters was tested at the electronic simulator. The experiments gave evidence of the following facts: In the construction of a non-linear control system with regard to the dry friction and all orders of the invariable part, but without regard to the clearance and the lag, it became evident that as compared with a linear control system the adjustment time is lowered by a factor of 2,6 and the frequency band transmitted by the system becomes larger by a factor of 2.
When considering the clearance and the lag an additional circuit shunting the clearance must be introduced. Here also a good reaction process (adjustment) is obtained. This is carried by a

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factor of 2,4 than in the linear adjustment. But it is worse than the adjustment process obtained in non-linear control in a system without clearance and lag. The non-linear control part here is rather simple. A respective device can also be constructed into a real automatic system for control of the pressing device. There are 14 figures and 9 references, 5 of which are Soviet.

SUBMITTED: June 20, 1957

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PHASE I BOOK EXPLOITATION SOV/3730

Fel'dbaum, Aleksandr Aronovich

Vychislitel'nyye ustroystva v avtomaticheskikh sistemakh (Calculating Devices in Automatic Systems) Moscow, Fizmatgiz, 1959. 800 p. Errata slip inserted. 15,000 copies printed.

Ed.: N.A. Korolev; Tech. Ed.: S.N. Akhlamov.

PURPOSE: This book is intended for mathematicians, scientists, and engineers working in the field of automatic control and electronic computers, and for advanced students specializing in the same field

COVERAGE: This book discusses the most advanced stage of automatic control, i.e., the use of internal computing devices serving those parts of automatic systems which control the system. In addition to presenting fundamental diagrams and discussing the theory and principles of automatic control, the book discusses a number of mathematical, scientific, and engineering problems connected with electronic computers and automatic control. This book arose out of a series of lectures by the author in 1954-1956 to students of institutes of higher technical education and to teaching and engineering-technical staffs of the institutes. The book is divided into three parts. The first part discusses the fundamental concepts and methods of analyzing the theory of automatic

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systems. In the second part, the principles of constructing computers are discussed. The third and largest part is a study of ways of building computers into an automatic system. The author thanks A.V. Khramoy, candidate of the Technical Sciences, Ya. Z. Tsypkin, Doctor of Technical Sciences, N.A. Koroleva, Candidate of Technical Sciences, and Yu. A. Shreyder, Candidate of Physics and Mathematics. There are 533 Soviet and non-Soviet references, listed according to chapter.

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FELDBAUM, A. A.

25(5) PHASE I BOOK EXPLOITATION SOV/2580

Avtomatizatsiya proizvodstva (Automation of Production) Moscow, Izd-vo "Znaniye," 1959. 31 p. (Series: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya IV, 1959, Nr 17) 47,500 copies printed.

Sponsoring Agency: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy.

Ed.: T. F. Islankina; Tech. Ed.: L. Ye. Atroshchenko.

PURPOSE: This pamphlet is intended for the general reader.

COVERAGE: The three articles comprising this pamphlet discuss the status of automation of machinery-manufacturing operation, review the prospects automation of the chemical industry and briefly describe computing devices necessary for automating production processes. No personalities are mentioned. There are no references.

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FEL'DBAUM, A.A.

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AUTHOR: Morozanov, I. S. SOV/30-59-1-48/57

TITLE: Development of the Theory and the Application of Discreet Automatic Systems (Razvitiye teorii i primeneniy diskretnykh avtomaticheskikh sistem)

PERIODICAL: Vestnik Akademii nauk SSSR, 1959, Nr 1, pp 138-139 (USSR)

ABSTRACT: The conference dealing with this problem took place in Moscow from September 22 to 26, 1958 and was opened by V. A. Trapeznikov, chairman of the Natsional'nyy komitet SSSR po avtomaticheskomu upravleniyu (National Committee of the USSR for Automatic Control). In the Plenary Meeting Ya. Z. Tsypkin reported on discreet automatic systems and their development prospects. The work of the conference was undertaken by 3 sections. Reports were held by:).
G. P. Tartakovskiy and V. P. Perov reported on new investigation results in the case of pulse systems with variable parameters.
Pan Ch'ung-wei dealt in his report with his successful procedures of analysis of pulse systems with several elements.
F. M. Kilin spoke about the problem of an increase of the perturbation stability of the systems.

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Ya. Z. Tsypkin investigated the possibilities of pulse systems.
[illegible] investigated one of the possible ways of constructing an automatic control system with a discreet correcting device.
E. A. Kregius analysed pulse systems.
[illegible] investigated the conditions of eigen oscillations (avtokolebaniya) in a system with wide range pulse modulation.
Yu. V. Dolgolenko reported on the method of determining parameters of a boundary cycle for an extreme system.
V. V. Kazakevich dealt with the results of approximation calculation methods of extreme systems.
A. A. Fel'dbaum investigated the influence of perturbations.
A. G. Butkovskiy and S. N. Domanitskiy reported on the construction of optimum-control systems for objects with retardation.
O. K. Natshafova investigated methods of determining the maximum [illegible] effect of control systems.
G. G. Varshavskiy spoke about the construction of an automatic machine for objects with retardation which permits the best possible control systems.

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M. A. Gavrilov analysed modern telemechanical equipment from the viewpoint of the so-called "finite automatic machines" (consisting of systems of a finite number of elements).
P. P. Parkhomenko reported on the effect and construction of a special logical machine for the analysis of relay orders.
Yu. Ya. Basilevskiy investigated accurate "finite automatic machines" which in the case of an unvariable structure furnish arbitrary items of several arguments.
G. K. Berends and A. A. Tal' reported on a pneumatic system of elements of "finite automatic machines" with the logical elements described as "not", "and", "or" by means of which further logical functions can be put into practice.
The participants in the conference considered the technical working out of the papers presented for them insufficient. In the last session the heads of the committees summarized the results obtained at the conference and briefly mentioned the important tasks in further developing the theory and the application of discreet automatic systems.

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28(2)

SOV/19-59-3-177/306

AUTHORS: Fel'dbaum, A.A., and Manukhin, A.I.

TITLE: An Electronic Apparatus for Obtaining the Functions of Two Variables

PERIODICAL: Byulleten' izobreteniy, 1959, Nr. 3, pp 44-45 (USSR)

ABSTRACT: Class 42d, 4. Nr. 100891 (450103/A919/3453 of 16 Oct 1951). Submitted to the Ministry of Communication Means Industry. 1) An apparatus as in title, consisting of a unit producing several voltages which are the functions of one variable, a series of multiplying units and an adding unit. To increase the operational speed and to make the system simpler, the multiplying units are electronic, and their characteristics have the shape of triangles in a certain stretch. 2) An apparatus as above, of simplified design, with the multiplying units in the form of electronic keys multiplying by a pulse-time system.

AUTHOR: Fel'dbaum, A.A. Professor, Doctor of Technical Sciences, SOV/144-59-2-3/19
Luginskiy, Ya.N. and Portnoy, M.G., Engineers

TITLE: Discussion (on the Use of Electronic Simulators for Investigating the Stability of Parallel Operation of Alternators of Comparable Power)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Elektromekhanika, 1959, Nr 2, pp 27 - 30 (USSR)

ABSTRACT: Professor A.A. Fel'dbaum, Doctor of Technical Sciences at the USSR Academy of Science's Institute of Automatics and Telemechanics, said that some of the faults he had to find with the paper were the absence either of detailed comparisons with practical or theoretical investigations or of comparison with results obtained on other analogue machines, or mention of electromechanical models or digital methods. In the USA analogue machines have been used for problems on the control and flow of power in large systems. The advantage of operating analogue machines in real time was the possibility of including real hardware such as regulators and relay protection, etc. A disadvantage was the need for the intermediate step of setting up all the equations in a suitable form;

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any factor left out would not appear in the final solution. The question of error was important and difficult; in fact, in some cases the assessment of error was more tedious than the problem itself. The errors likely to be expected ranged from ± 0.01% to ± 1%, depending on which unit was considered. There were, however, three important influences on accuracy. The first was that due to error accumulation. In the simplest form it appears when commoning the outputs of several units. The second was amplifier error - was more serious and was a feature of the successive connection of amplifiers. Thirdly, there was feedback error, which when simulating a highly undamped process, could give hopelessly wrong results. The use of analogue and digital machines in hybrid arrangements was briefly hinted at. Ya.N. Luginskiy and M.G. Portnoy, Engineers at the All-Union Electrical Energy Scientific Research Institute, gave some additional references to published work on the

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present topic. They had done work in this field in 1958 (Ref 6). The first step in their analysis had been the behaviour of an alternator when connected to infinite busbars. The starting point was the Gorev-Park set of equations. The simulation later included various kinds of voltage regulator. The machine comprised several blocks from IPT-5 and KNB. It was used for studies on self-synchronization (Ref 7), resynchronization (Ref 8), excitation control (Ref 9), prime-mover governing (Ref 10) and so on. A preliminary study was made of the problem of interconnecting several generating stations of comparable power. The strict solution required a prohibitive amount of hardware.
There are 10 references, 7 of which are Soviet and 3 English.

ASSOCIATIONS: IAT and VNIIE

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D037/D006

AUTHORS: Fel'dbaum, A.A., Stakhovskiy, R.I.

TITLE: A Device for Automatically Determining the Minimum (or Maximum) of the Function of "n" Variables

PERIODICAL: Byulleten' izobreteniy, 1959, Nr 21, pp 58-59 (USSR)

ABSTRACT: Class 42m, 14. Nr 123759 (582931/26 of 5 September 1957). 1) This device is for automatically determining the minimum (or maximum) of the function of "n" variables by the methods of the most rapid fall and gradient. It contains a unit for measuring partial increments, units for feeding trial increments, memory units, integrating units, keys and a programming unit. To accelerate the minimization process and reduce errors in determining the extremum, the partial increment meter is connected by keys with the n-memory elements, whose outlets are connected by other keys with the re-

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A Device for Automatically Determining the Minimum (or Maximum) of the Function of "n" Variables

spective output integrating elements. 2) To calculate additional limits superposed on the range of change of the variables, a unit is placed between the minimization object and an additional input in the device; this unit automatically returns the image point (the totality of the current values of the variables) to a range where the limits are absent (in the case where the point exceeds its limits). The unit consists of an adder of the signals of the limits, an indicator showing when the permissible limits have been exceeded and a switch for the devices main and additonal inputs. 3) To increase the accuracy when approaching the extremum, a two-circuit programming unit is used. It contains a circuit for determining the gradient and a circuit for carrying out the method of the most rapid fall, which is con-

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